The Builder.

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Fire.

FOR the second time, within little more than six months, the Metropolis has been the scene of one of those great calamities which, in our happily situated country, may be said in some degree to correspond to the ravages of the earthquake in the South. It is not merely in the magnitude of the destructive power, so far as its activity extends, or in the sudden nature of the mischief, that a parallel exists. We shall see, if we look a little into the matter, a sound architectural reason for the fact that those seats of the great building races that are liable to devastation by earthquake, are, comparatively speaking, but rarely desolated by fire; unless when it occurs after earthquake. This combination of disaster is, however, not infrequent. We speak, moreover, of building races. Especially we refer to the Italians. In other southern climates, as at Constantinople, where earthquake is not an unknown visitor, fire is even more unchecked in its ravages than amongst ourselves.

The columns of our contemporaries have not failed to be filled, not only with detailed accounts of the great fire at the Pantechnicon, on the 13th of February, but with suggestions, recommendations, and warnings, many of which are highly deserving of attention, and have, before now, appeared in our pages.

It cannot fail to strike a reflective mind, that the three most lamentable fires that have been witnessed for some time in the immediate vicinity of London, have occurred in those very buildings which might have been naturally regarded as least liable to such a calamity. At Sydenham, it might almost be said that water-works took fire. A building, the superstructure of which consisted mainly of iron and glass; which contained open tanks and fountains, fed by abundant supplies of water; and that was connected with the most powerful artificial head of water, stored for the purposes of a magnificent display of fountains, might well have been regarded as incombustible. At Muswell Hill, the vast airy expanse of the building, and the extreme improbability that fire would ever be kindled in the vicinity of the dome, seem to have lulled the apprehensions of the architect, and allowed of the introduction of materials that were desirable for lightness, and probably for cheapness, but that proved fearfully combustible in the unforeseen case of danger. In each case, however, as at the Pantechnicon, occurred the same instructive phenomena. First, safety was a question of minutes, or rather of seconds. Secondly, it seemed to have been forgotten that to make a building in itself incombustible, if that can be effected, is not to prevent it from acting in the capacity of a furnace. For all purposes in which intense heat is required, it is essential to build incombustible furnaces. That remark is not without direct application to each of the three great disasters to which we refer.

It would be a strangely humiliating fact if, in the present state of architectural splendour and of engineering skill, we were compelled to admit fire to be, with earthquake, a non-preventible evil. Practically, indeed, we may be told that such is the case. But, if so, it must be because our practice is bad. There is a certain borderland of unexplained phenomena, to which speculation is wont to resort, with singular pertinacity, on almost all occasions of great fires, by way of laying the blame, not on carelessness, or on want of foresight, but on "the nature of things." "Spontaneous combustion" is a verdict which may be compared to the "found dead" of a coroner's jury. We do not deny that, in some cases, such a source of danger exists. In the bunkers of a steam-vessel, where the disengagement of carburetted or sulphuretted hydrogen from a mass of coal may be stimulated by the motion of the vessel, the occasional outburst of self-originated fire is certain, but the occasions are rare. Many supposed cases disappear on investigation, and it must not be forgotten that the mere acknowledgment of the possibility of such a source of danger is enough to call for the exercise of precaution of an adequate nature.

Without denying, then, the occasional occurrence of fires, which may be said to originate, only in the second degree, from carelessness, we cannot doubt that, in the great majority of cases in mines, ships, farmyards, churches, or other great buildings, the actual cause of fire is pure and inexcusable carelessness. We know that, in mines, and we suspect that, in many other instances, the habit of smoking has had much to answer for. But that is not the point to which we now wish to call the attention of our readers. Asserting that fire is, in itself, a preventible calamity, and holding, in consequence, that the detection of the cause of any great fire ought to be made serviceable, in the way of indicating more precautions for the future, we look for the practicable out-come derivable from this last, in some respects irreparable calamity.

There are three modes by which human care and skill may attempt to prevent the ravages of fire. Of these we are familiar with the first and with the third. But we are of opinion that we most inexcusably neglect the second. The modes to which we refer are: prevention; circumscription, or limitation; and extinction. Each demands thoughtful consideration.

Prevention of fire is a matter of personal and individual conscientiousness. It is thus a matter on which the public writer can hope to exercise but little favourable influence. Nor can legislation be expected to come much in aid. Arson, indeed,—or wilful fire-raising,—is one of those detestable crimes to which, as to the attempt to upset a railway train, the utmost rigour of the law should not only be applied, but in reference to which it might well be whetted and sharpened. But that fire-raising which is to be compared, not to murder, but to manslaughter, is less easy to bring under criminal purview. Very frequently the knowledge of the cause is confined to the breast of the culprit, as seems to have been the case at the Alexandra fire. We can thus rarely hope to ascertain the actual truth. And when we see how inoperative is that which is usually considered the most powerful of all motives, the loss of life itself, to deter the miner from the perilous luxury of a forbidden smoke,—how we find an unguarded lamp, or a box of lucifer matches, in almost every instance after an explosion of fire-damp, we can only conclude that a certain amount of gross, fatal, ineradicable carelessness, is one of those certain elements of danger against which we have to provide in contemplating protection from fire.

This leads to the consideration of one of those safeguards which have been suggested in the course of the discussion as to the recent conflagration. The employment of a watchman in a great building has been urged as a safeguard against an unsuspected outburst of flames. Now, this is a subject on which we cannot afford to experiment. We may draw, and ought to draw, the fullest lesson from the calamities that take place beneath our very eyes; but we must attempt no remedies that are at all of a questionable nature. A watchman is one of these. A watchman must have a light. If he be not openly provided with one, he will, according to the general experience of human nature, provide himself with surreptitious means of obtaining one—at all events, in case of alarm. Here, then, is a new source of danger open. The most careful and trustworthy watchman may have a fit. He may fall asleep. If he be any but the most reliable patrole, he may be drunk. If two men are stationed in a building they may quarrel. Thus while the only service to be expected from a watchman is an early detection of fire, and of fire that must arise from some want of care or of structural protection, in the first instance, his presence involves an actual source of danger. This ought to be well pondered before a night-watchman is introduced to the interior of any important and non-inhabited building.

While, therefore, we are of opinion that it is a mischievous fallacy to seek to attribute the origin of mysterious fires to the automatic action of chemistry, we think that the builder must regard fire as one of those evils to which the carelessness, the stupidity, the misfortune, or the malice, of man, is tolerably certain to expose his work within the period calculated for its durability. If we rely on such care that no spark can fly or fall so many times in a century, we shall certainly be in the wrong. We ought, therefore, as sane men, to regard the matter in another light. We must provide for limiting the mischief, if it unfortunately make its appearance. Let us take every care, indeed, that a muslin curtain or a crate of straw shall not take fire. But let us, none the less, look in the face the fact that it may do so; and let us provide and prepare accordingly. In a word, let us not trust to moral safeguards. They may be good, but they must be imperfect. Let us look for a more perfect, because a self-acting, means of protection.

This, there can be no denial, is to be found in wise precautions, calculated to limit the ravages of fire, if it should once gain a head. The destructive element is not a mysterious enemy. Its mode of growth is well known. One function of its fury, indeed is capricious, and incapable of prediction. We mean the force and direction of the wind. But in that fact we have one of those limits which only the fatuous neglect to improve. We must remember that fire is a familiar. It is, all things considered, the most potent and serviceable of those energies of nature which have been subdued to the service of mankind. It is an essential minister in every house. But, in domestic life, we have the habit of confining the elemental spirit within saf bounds. We limit our combustion to the grate. We allow a free and wasteful radiation of heat from open stoves into our rooms, in a manner unknown to our Continental neighbours, and we do this with a great amount of practical safety. The occurrence of a fire from a sitting-room or bedroom fireplace, is an accident which, if we calculate the number of household fires daily lighted, is of almost inappreciable rarity. If the simple precaution of a fireguard be adopted when a fire is left unwatched, domestic safety from this source of danger is almost absolute.

This is the case because, instead of taking it for granted that fire will not occur, we take it for granted that it will occur; and, in so doing, we limit the field of its operation. What every architect does, in every house, the principles of

architecture, no less than those of common sense, prescribe as right to be done in store-houses, museums, libraries, and all those places where great stores of combustible materials are notably accumulated.

The only absolute safety, then, lies in regarding each apartment, containing or intended to contain such combustibles, as a furnace, and as a furnace that may at any moment be lighted. The duty of the architect in that case is clear. It is to provide such a backing, and roofing, and flooring for the furnace that its contents may consume without inflaming the contents of the neighbouring furnaces. Viewed in this light, the problem becomes one of great simplicity, and the more so because it is not the duty of the architect to provide for the free consumption of these possible furnaces, but the very reverse. Ventilation is not required to be free and constant; on the contrary, the less ventilation the better. No chimney is required—no air-flue is required. The chamber of which we speak is reduced to the condition of a simple cell. Ingress must be given by a door. Light must be admitted, and if this can be done by glazing the door, so as to make only one aperture in the chamber, so much the safer. In a word, the safety of a great building can only be secured when that building is divided into compartments, so arranged that if fire occurs in either of them, it will burn itself out therein, without communicating to the neighbouring chambers.

There is no difficulty in carrying out this principle. With regard to buildings that are erected for the purposes of display, such as palaces, theatres, churches and the like, of course special circumstances demand large and lofty apartments, and free means of common action. Even in public museums something of this nature is requisite. But we are now regarding chiefly the warehouse or store-room. We recall the case of that fearful volcano into which a lofty water-side flour-mill was converted not long since. We refer, and that not without a shudder, to the lofty private warehouses that are growing up around St. Paul's Cathedral. They almost emulate the height of the nave. If one of these were converted, by a few minutes' neglect, into a furnace vomiting flames, the cathedral would be in imminent danger. The lead on its roof would melt, if the winds set in that direction. And the results of the fall of molten lead into a building rarely stops short of its destruction.

It is quite true that the London of 1666 was far more exposed, from its wooden gables, and its occasional thatched roofs, to the contagion of fire, than is the London of 1874. But it is also true that the source of danger—the vast piles of combustibles that are liable at any moment to be converted into living centres of destruction—have increased in a ratio at all events equal to that of the existing structural power of our buildings. Our floors are still, as a rule, of wood. Our roofs are of wood, but thinly covered with slates, materials themselves far less protective than the ancient tiles, unless in so far as their joints lie closer. The slate is far more readily destructible than the baked earth of the tile. All is question of head; of the head gained by the furnace power. Water itself may be turned into the fiercest of all combustibles. There seems to be little doubt that if the wind had been other than it was, a great part of the most costly district of London would have been destroyed by the contagion of the fire, that attained such fearful energy at Motcomb-street. It is a case to come home to every man who has a bed, or even a skin, to sleep in.

We do not wish now to enter into any constructive details. We are aware that materials and provisions such as cast-iron columns and stone staircases, which forty years ago were considered fireproof, have been found, by experience, to be sources of more danger than ruder and more old-fashioned appliances. But our choice of proper fireproof materials is ample, if we bear in mind that it only is by such a division of any great accumulation of combustible materials as will allow of a portion burning without inflaming the rest, that urban safety can be secured. No man ought to be allowed to rear in a city a building in which, if fire once attains a head, an irresistible centre of conflagration will be established.

This leads us to the third question, that of extinction. We are aware that, on this point, for one matter that is satisfactory there are many that are quite the reverse. The chief feature that befits the enlightenment of the day, and that may well be a matter of natural pride, is to be found in the organisation, the skill, the tried courage, and the unflinching devotion of our Fire Brigade. All honour to those noble men; nor should we omit to bear testimony to the great amount of neighbourly feeling, and good old English helpfulness, evinced for the most part by the crowd. Under an emergency, such as that of a great fire, the national spirit comes out in a form not unworthy of our history. But when we go a step further, when we inquire into the water supply, always short for that first five minutes in which a drop is worth more than many a bucketful a little later; when we think of municipal regulations, of the organisation of the interchange of aid between police, troops, firemen, and assistants of all kinds, we must admit a very wasteful and blind administration of our powerful machinery for extinction.

As to the necessary replacement of the relics of institutions, intended for a much sparer population than that of London, as it now exists, by a municipal organisation worthy of the name, we have not now to speak. It must come, sooner or later, unless we are altogether drifting backwards toward cannibalism; a tendency which some circumstances might almost be held to indicate as possible. But we have to point out the propriety of the addition of a new element to our protective organisation. It is one not of very alarming dimensions, but the efficacy of which would be invaluable. To our fire-brigade should be added, we suggest, a supplementary body of men, bearing the same relation to the active service that the detective police bears to the ordinary police. We want a small, picked, well-appointed body of fire detectives. Fire preventives would perhaps be a better title. We mean men whose duty would be to visit, unexpectedly, any great warehouse, or other centres of danger, and to give the alarm of fire; not an unnecessarily false alarm, but such a call as should at once show the state of the water supply, and of provisions of any kind for extinction or limitation of fire.

We have an admirable illustration of what we suggest, or rather we had, a few years back. If there was one artificial unit of which the European races ever had cause to feel justly proud, it was the first-rate man-of-war of the beginning of the present century. Englishmen regarded such a vessel with the greater veneration, because in her service and handling, the old national vice, that lost England to the Norman, seemed to be exterminated. There was no unreadiness in a man-of-war; the very contrary was the case. And of all the institutions of the service nothing tended more strongly to keep up the characteristic alacrity of the English sailor than the fact that, at least every year, the captain of a man-of-war was taught to beat unexpectedly to quarters. It might be by night—it might be in the still and dreamy afternoon. The best time was the most unexpected. Then, from the first note of the signal, the number of seconds that elapsed before bulkheads were drawn, hammocks swung, portholes open, and the great war-ship fully prepared for action were exactly noted. If we would secure as much readiness, both of men and of means, on the alarm of fire, we might sleep in peace.

Something of this kind might be effected by the means we propose. There are establishments in which we can note an ostentatious display of buckets and other provisions against fire. We do not undervalue such a display. Far from it. But it would be well for them, as well as for their neighbours, to have the actual and instant effecting of these means tested at unlooked-for times. We should take warning from the almost universal complaint of want of water at the outbreak of a fire. It is a question, as we said before, of seconds. We do not think that that question will ever be satisfactorily settled except by some such means as we propose. Quiet care is admirable; constant supervision is admirable; but the question always exists, whether the watch-dog may not go to sleep? It is only by means of an unexpected call that we can learn whether safety is actual, or only superficial. That call may be given by a wise organisation, such as that which we suggest. If not, it *will* be given, and given by the enemy. When it is so given, we are, in nine cases out of ten, unprepared. We prepare quickly, no doubt; that is a national virtue. But a constant normal state of preparation is not our habit. It is such a state that alone is safe, as regards the extinction of fire. When we consider the enormous losses that annually occur—we will say nothing of the consumption of silk and linen, of wood and metal, of anything that living art can replace,—but the irreparable destruction of paintings and objects of antique beauty and history—what would be the comparative cost of such a small squadron of protectives as we suggest? The insurance companies, the great merchants and warehousemen, the citizens and householders, are all interested in the matter. Parliament might have to be asked to clothe the new force with some little power of inquisition, in the interest of public safety. We ask how many fire-extinguishers would be practically dispensed with for every fire-preventer that may be thus employed?

PROPORTION AND SYMMETRY.

A PLANE may intersect a solid figure in any direction. In mechanical and architectural drawings, we are in the habit of drawing such imaginary sections, as they are called, for the guidance of the workman, because this method of delineation frequently allows of a more ready determination of the ruling dimensions of the figure required than any other. The outline of this section, or imaginary plane, is properly called a profile.

The simplest form of solid is a sphere. In a sphere every section is a circle, and every section that passes through the centre is an equal circle. In the cube, numerous sections may be drawn through the centre, the form of each of which will vary according to the angle which it makes with the sides of the cube. But the sections which are drawn parallel to the sides, that is to say at right angles with each other, are all equal squares, and are identical in size with the sides of the cube.

When Nature first commences a definite structural work, she builds up certain elements in definite geometrical forms, which we term crystals. In crystals the inclination at which the three axes, which in a cube are at right angles to each other, are dispersed, vary according to the nature of the crystal. The beautiful little fragments of rock spar which strew the ground at Matlock, as if with a broken mosaic of purple glass, are examples of a simple and beautiful form of obliquely-formed crystal.

The measurement of the three axes, and of the angles at which they intersect, gives the accurate form of every regular solid. In ordinary cases, we consider these axes to be at right angles to one another, and we call the three dimensions, according to their respective magnitude, length, breadth, and thickness.

In all organic bodies, and in all structural works of the human artificer, the relation of these three dimensions is termed proportion, or symmetry. It is not arbitrary, but is the result of law, however much or however little we may be able to trace the operation of that law. But, even when the mind may be unable to grasp the reason, the eye has an instinctive sense of the fitness of the proportion, and we find, by the test of actual measurement, first that the eye can appreciate an incredibly small difference of proportion, and, secondly, that the most beautiful proportions, both in nature and in the highest works of art, are exactly divided so as to hold distinct numerical relations to one another.

It is a highly instructive experiment, in order to realise the truth of the above statements, to measure a number of eggs. Those of the hen are at once the most easy of access, and the best adapted to illustrate our meaning. The normal proportion of the major and minor axes, that is to say, of the length and greatest breadth of the egg of the hen, is as seven to five. If a series of eggs are measured by a pair of callipers, on some delicate scale (that of 30 to the inch is one of the best adapted to the purpose), it will be found that the slightest deviation from this proportion is readily appreciated by the eye. The experimenter will be at first surprised by the accuracy of his perception. An egg will be selected as unusually long, or unusually round; but it will be found on measurement that the difference from 68 to 72 thirtieths of an inch in length, and from 48 to 52 in breadth, is very rarely exceeded, and that those which seem to be the most disproportionate usually come within these narrow limits.

If we extend our study beyond the egg of the hen, greater disproportion will be found; the form of the bird being often, though not always, indicated by that of the egg. Thus, in the owls' eggs we have the nearest approach to the sphere. Among the stilt birds, or waders, we have generally an elongated egg, tapering to a point

at one end, as if to allow room for the growth of the long tarsi of the embryo chick. Yet the egg of the ostrich, the great stalker of the desert, is nearly as round as that of an owl. Of all eggs, however, that of the hen most closely approaches the proportion of the most beautiful human face, as determined by Greek art.

The absolute accuracy with which the Greek architects followed numerical proportion in their works is, of course, well known to the student. We may cite the regularity of the intercolumniations of the different orders, and the reference of each work to its own modulus, as an example. The diameter of the column is the modulus, or unit, of the entire building. In each distinct order the slenderness of the column,—that is to say, its height in proportion to its diameter,—is connected, by ascertainable laws, with the spaces at which the columns are set apart. Thus, these spaces are not only equal to one another, but definitely proportioned to the diameter of the column. A very remarkable exception to this general rule (if we can absolutely rely on the inferences drawn from the relics discovered *in situ*) is afforded by the famous Temple of Diana at Ephesus; the recent discovery of which does such honour to Mr. Wood. In the sketch plan, which our contemporary the *Athenæum* published of this great fane, the intercolumniations at the ends differed from each other, becoming wider towards the centre. This anomalous disposition is probably to be associated with the unusual decoration of the columns themselves, by sculpture in very bold relief and of the size of life. By the time of Alexander the Great, sculpture had passed its most lofty phase, and the executive power of the art was then being developed at the expense of its sublimity. It is far from impossible that the completion of the excavations on the site of the Temple of Artemis may convince us that architecture, like sculpture, gained in splendour at the expense of purity. It is hardly conceivable that an irregular intercolumniation such as that to which we refer should not detract from the harmonious grandeur of the elevation of the fane; especially when seen from such a distance as to prevent the eye from being seduced from its natural instinct by the picturesque effect of the sculpture.

It may be thought, and no doubt it generally is thought, natural, that architecture, as dealing with structures composed of rectangular blocks and beams, may have a definite relation to the laws of numeric proportion, from which the sculpture, as dealing with the exquisitely varied attitudes of the human form, is altogether free. Few but those who have deeply studied the subject will hear without surprise that the contrary is the case. The canon of numeric proportion, as regards the human form, which has been followed by the sculptors of the noblest era of Grecian art, has been as definite and exact as any that is exemplified by the orders of Classical architecture.

Two of the most famous artists, each in his own school, of modern times, have attacked this problem. Leonardo da Vinci has indicated the importance of the study in his treatise on painting, and has further left, scattered through the voluminous MSS. which he never reduced to systematic form, many empirical rules. Thus he tells us, "A man has the length of two heads from the extremity of one shoulder to the other; the same from the shoulder to the elbow, and from the elbow to the fingers; but the child has only one." Again, he says, "A man, in his infancy, has the breadth of his shoulders equal to the length of his face, and to the length of the arm from the shoulder to the elbow when the arm is bent. It is the same from the lower belly to the knee, and from the knee to the foot. But when a man has arrived at the period of his full growth, every one of these dimensions becomes double in length, except the face; which, with the top of the head, undergoes but very little alteration in length. A well-proportioned and full-grown man, therefore, is ten times the length of his face; the breadth of his shoulders will be two faces; and in like manner all the above lengths will be double." But in another place he says, "In general the dimensions of the human body are to be considered in the length, and not in the breadth; because, in the wonderful works of nature, which we endeavour to imitate, we cannot in any species find any one part in one model precisely similar to the same part in another." In the writings of Leonardo on this subject, then, we find far less by way of guidance than we do in his noblest pictures. In his Leda, for example, there is a delicacy of proportion far in advance of the rough mechanical rules above indicated.

Albrecht Dürer gave great labour to the investigation of human proportion. There is a folio volume, printed in 1528, of his drawings and calculations. He took for his guidance the principle of the equipoise of the living form, and thus entered into the investigation of the volume of the different portions of the frame. But he entirely loses his way in the multiplicity of details, and especially as regards the relative proportions of the sexes he arrives at results which may apply to German models, but which are altogether opposed to the examples of the finest Greek art.

The whole subject of human symmetry has been very fully discussed in a series of papers in the columns of a contemporary, which has, we believe, ceased to appear.* The various questions are treated in a systematic and condensed form, and we shall not scruple to make use of some of the definite results at which the writer has arrived, from the actual measurement of the most famous examples of the art of the Greek sculptor.

We wish, however, first to call attention to a subject to which we have more than once had occasion to refer, although it has never yet, to the best of our knowledge, been dealt with on exact geometric principles. We are the more interested in the investigation from the close relation that exists, or that ought to exist, between this particular branch of sculpture, and the science and skill of the architect. We refer to the treatment of a seated figure, sculptured in the round, and especially to the treatment of such a figure when it is of heroic or colossal size. For the framing or setting of such a figure the service of the architect is indispensable. The more thoroughly the sculptor is the master of his own art, the more fully will he be aware that such a figure, if executed with requisite skill, can only be seen with advantage from certain points of view. In work of a truly colossal size, such as the gigantic statue of Memnon, the grandeur that results from that one element of size, is such as to fill the mind, and to divert the eye from any too curious admeasurement of the details of the figure. In all Egyptian sculpture conventionalism is dominant. Each figure, and each part of each figure, is designed on definite geometric scale, and displayed after certain fixed conventional rules, which are not those of perspective. Nor are the proportions of the figure those of nature. The feeling of the Egyptian artist is one of an entirely different order from that of the Greek. Nor do we judge his work by the same rules. Instinctively, whether educated in art or otherwise, do we perceive the difference. We never think of comparing the mighty shoulders, the impossible waist, the flat feet, and the spectacle-like eye which are repeated incessantly on the tombs of Karnac, with the living form, or with the superhuman grandeur attained by Phidias. We are content to appreciate the eternal calm, the undisturbed smile, the superiority, alike to human cares and to heed of human opinion, which are expressed by the conventional art of Egypt. Let our readers study the grand examples contained in the British Museum, which are now placed within the reach of every one by a series of admirable photographs, which may be obtained at low prices (involving, we are sorry to learn, considerable loss to the publishers) of Messrs. Mansell, of Percy-street.

To the colossal Memnon we only refer in anticipation of any reference, to that archaic wonder by way of set off to the definite point we have now to bring forward. It is impossible, we hold, for the sculptor to produce a colossal figure, visible from the four sides, that shall not be a failure from at least two points of view. We are not about to make this assertion as resting on authority, whether our own, or that of any one else. It is a simple geometric necessity. If we take the height of the human figure, according to the scale suggested by Mr. Conder, as consisting of 960 lines, when standing erect, the height of the same figure, when seated on a support level with the under side of the patella, will be 780 lines. This method of measurement is applicable to every figure, which is thus measurable by aliquot parts of its own height, and allow of the accurate comparison of figure with figure, as in perspective drawing. Now, if the observer stands in front of the figure, the eye of the former being on the level of the feet of the latter, and the distance of the point of vision being three times the height of the figure (or 2,880 lines), the face of the statue will occupy different planes if we compare the standing and the seated figure. Let us consider the foot, in each instance, to be planted on the same space. In taking the seated posture, the figure which we are regarding will have lost, as we before stated, 180 lines, or six thirty-secondths of its full height. But, at the same time, the face will have been removed further from the spectator. The length between the two perpendicular lines which fall in front of the knee, and behind the head of the seated figure, if its proportions are correct, is 320 lines, or one-third of the height. And it will be found by a very simple diagram that the difference between the scale, a size apparent to the eye, at these distances, is not much less than one-twelfth part. In other words, if the proper height for the face, the figure being erect, were 12 inches, it would require to be made 13 inches long by the different distance of the plane which it was made to occupy by the change of posture. We have given the difference rather in excess, for the sake of clearness, as the face will not be removed to the full distance named, which is that of the back of the head, but the figures are near enough for our purpose.

If the matter be looked at geometrically, it will be found that the angle introduced between the feet and the head of the figure, if seated on the plane nearest to the eye, is 15° 9′. The removal of the object from the distance of 2,880 lines to that of 3,200 lines, which is the result of changing the posture, demands a vertical height of 860 lines, in the more distant position, to preserve the same angle of vision.

We allow, as before stated, that the plane of the face will be somewhat nearer the spectator if the seated figure be quite erect. If, on the other hand, the foot be thrown forward, and the hand back, as in the woeful instance of Mr. Peabody's figure, the difference will be greater than we have stated. The face and trunk, in fact, must be treated on a scale of one-twelfth larger size than the fore leg. This, of course, it is easy to effect.

But when we come to regard the same figure in profile, the circumstances are altered. Then the planes of face and foot coincide, or nearly so. And then the head, which we have been obliged to raise to the height of 860 lines from the ground in order to satisfy the exigency of perspective, for the front view, will be visibly out of place, being 80 lines higher than its proper level of 780 lines from the ground.

We have gone into this detail, not so much for the purpose of showing the ready application of an automatic division of the human figure, which so readily lends itself to the service of calculation, and so much simplifies any perspective reduction, as in order to prove that, from the simplest optical law, the attempt to form a seated figure, of colossal size, which is to be seen from the face and from the profile, must result in failure. Actual visual proportion forbids the success of the attempt. We have said nothing of sculptural composition. The difficulty here is not less; but it is no less capable of being geometrically demonstrated, or reduced to numerical rule. We know how the Greek artists dealt with this branch of composition. In the finest seated figures of the Elgin Collection, the height of the thigh is determined, not by the usual proportion of that limb, but by the effect on the eye of the spectator from the point where Phidias intended that his sculpture should be placed. It is most evident that when a sculptural fore-shortening, or it might be fore-lengthening, of any portion of a figure is introduced, the limitation of the point of view must be absolute. And no sculpture, worthy of the name, can exist without close attention being paid to these niceties of composition. Our case may thus be made stronger. But we wish to bring it to the test of actual figures. It cannot be denied that incompatible dimensions are required for the profile, and the full-faced view of a seated colossal figure.

* "Art, Pictorial and Industrial," February to July, 1873.

The Derby Portrait Memorial. — The committee of the Derby Portrait Memorial have purchased of M. Louis Desanges his portrait of the late Earl in his robes as Chancellor of the University of Oxford. The portrait—a *chef-d'œuvre* of the artist—will become the property of the nation. Colonel W. Nassau Lees acts as hon. secretary.

THE GREAT WESTERN ARCADE, BIRMINGHAM.

THE long-talked-of arcade from Monmouth-street to Temple-row, Birmingham, over the Great Western Railway is at last about to become a reality. It was the original intention, when the railway was made, to cover over the line between the two streets mentioned, and to utilise the space thus secured. The idea was never carried out, and one of the principal streets has been disfigured for many years, and the opportunity for making a much-needed addition to the street architecture, and providing a popular place of resort, as the arcades are in other places, has not been taken advantage of until the present time. Active operations, however, for the construction of "The Great Western Arcade" are now going on. The site has been purchased of the Great Western Railway Company by Mr. E. W. Simkin, and it is his speculation. The designs for the building have been prepared by Mr. W. H. Ward, architect. Mr. H. Lovatt, of Wolverhampton, has taken the contract for the first part of the work, consisting of the removal of the present iron girders, which were placed over the line by the late Mr. I. K. Brunel when the railway was constructed, and have become, through long exposure to the weather, totally unfit for building upon. In the place of the girders, a series of arches will be constructed, forming, in fact, a continuation of the present tunnel, and thus a site will be created on a level with Monmouth-street and Temple-row. The frontage to the two streets is nearly 100 ft., and it is intended to erect, as entrances to the arcade, an arch at each end, with shops on either side, and suites of rooms over in about four stories. The street elevations will be of stone, and the shop-fronts fitted with plate-glass. On each side of the arcade proper there will be shops of various sizes, between fifty and sixty in number, and especially adapted for fancy trades. Show-rooms will also be attached, and above the shops the necessary offices will be provided. The arcade is to be covered with a light construction of wood and glass, the circular ribs or principals of which will spring from pilasters between each shop. In the centre there will be an octagonal dome, rising some height above the roof, and the shops in that part will also be arranged in a similar manner. The total length of the arcade will be nearly 400 ft., and the width of the promenade between the shops about 25 ft. The Great Western Arcade will thus exceed in extent the Burlington Arcade, in Piccadilly. The whole of the work will be carried out under under the superintendence of Mr. Ward.

ARCHITECT TO THE CHILIAN REPUBLIC.

IT seems nothing will come of the hope expressed by one of our last year's correspondents, that the appointment of an English architect might extend our knowledge of earthquake-proof building. We are informed that out of ninety-six architects, who nearly a year ago responded to the advertisement in our columns, the selection fell last June on Mr. William Young. For some unexplained reason the appointment has been till now suspended; and last week the Chilian Government definitively abandoned all intention of engaging the architect advertised for.

SANITARY ARRANGEMENTS IN BARRACKS AND CAMPS.

IN the presence of a large audience, Major-General Millington H. Synge has lectured at the Royal United Service Institution, Whitehall-yard, "On Suggested Improvements in the Sanitary Arrangements in Barracks, Camps, &c." The chair was taken by Surgeon-General Mouat, V.C.

General Synge began his lecture by observing that he had to set before them truths discovered not by himself but by others. Dealing first with the subject of dwellings, he remarked that a house should be dry and warm, and have a pure atmosphere. He then called attention to those cases which affected the community most largely, namely, infectious cases. Water, in any form, rendered the vehicle of contagion, impregnated everything with which it was brought into contact. He quoted Mr. Hassall, to the effect that no hospital should discharge into any sewers, and proceeded to say that a ready means of vitiating the atmosphere was found in the pollution of water. In the words of Dr. Letheby, "The vengeance which nature takes does not confine itself to figures of arithmetic." The same authority asserted that the quantity of water annually fouled amounted to 30 gallons per head per day. The first point which he pressed upon his audience was that it was wrong to remove corrupting impurity by water, more especially in the case of hospitals, and most particularly in all infectious cases; secondly, it was right to provide for use and application a carrier, an effectual deodorant, in all such cases, whereby cleanliness and comfort would be given in a sick-room, ward, or bed, thus guarding against the spread of infection. Dealing next with the military part of his subject, he observed that if they laid their hands upon a healthy spot they would find it was a station not occupied by our troops. Sanitary law might be summed up something like this:—You may not pour corrupted water into rivers; you may not release destructive gases into the atmosphere. If it could be shown that liquid could be drawn off innocuously, according to General Scott's plan, a very great step in advance would have been taken. In concluding, Major-General Synge recommended charcoal as the best possible means of deodorisation.

The Chairman observed that the question was, How was this sewage which was supposed to be contaminating our rivers to be rendered innocuous? Major-General Synge said that charcoal was the panacea; but the question was how it was to be applied.

Mr. Rawlinson remarked that he had never heard so many fallacies uttered before in a given time as those which had come from the lecturer. If the public health was not to be secured until all sewers and drains were done away with, the reform would be a very long time in coming. London, in point of health, stood at the head of all cities, the mortality being from 22 to 26 per thousand, while in our large towns it was from 30 to 40 per thousand. He had gone through hospitals and other public buildings where the dry-earth system had been introduced, and found that so long as there was some enthusiastic person to watch over it, it was successful; but let them make out a balance-sheet of the cost, and they would see that the expense was as ten to one over water. He could not accept the gallant officer's paper; if he did accept it the next thing he would do would be to jump into the Thames and drown himself.

Dr. Gordon contended that hospitals and barracks ought to be so constructed as to prevent as far as possible the introduction of disease.

Colonel Murray affirmed that sewage irrigation was the only thing likely to be effectual.

Major-General Synge replied, adhering to his belief that fire was an instrument which destroyed the germs of disease, and that water disseminated them.

ANTIQUITIES OF MALTA.

SOME explorations of considerable interest have been made in the island of Malta, by Lieut. Wadham Terry. According to the *Morning Post*, a large number of tombs were opened, all beautifully cut in the solid limestone rock, each one closed with a slab of stone securely fixed in. The result of Mr. Terry's work has been the formation of a large collection of pottery, and other objects of interest, comprising between four and five hundred specimens. No such collection has ever been made before. The only one approaching it was made by Captain J. S. Swann, F.G.S., who communicated a paper to the Society of Antiquaries on the subject, which was published by the Society in 1870. Captain Swann's collection was not a very large or important one, and he appears to have been satisfied with his discoveries without going into the question of their origin or the period of their deposition.

It is the impression of Lieutenant Terry that the tombs he opened were the work of early Phœnicians, and that the objects found in them were deposited by that people. His reasons for that belief would occupy too much space here, but it is his intention to take some practical measures to bring his collection and views before the public shortly. Among other grounds which point to the highest antiquity of the tombs opened are such facts as the discovery of a scarabæus of a date at least 900 B.C., and the non-discovery of coins, which last is almost sufficient proof of a period anterior to the Ptolemaic. Time had further destroyed all but a few rusty traces of anything in the nature of a sword or other weapon. There were a few bangles found, but of a material calculated to resist rust. The marks on the various amphoræ and vases can hardly be the work of a people possessed of no alphabet, except a primitive one of numerals, similar to the Irish ogham, and it is doubtful if such marks are more than merely ornamental. The forms of everything, including a large number of lachrymatories, lamps, and articles of glass, are of a most primitive character.

MICROSCOPIC EXAMINATIONS OF THE AIR.

IN a review of a work by Mr. Douglas Cunningham, under this title, published in Calcutta, *Nature* describes the apparatus used by Mr. Cunningham and the results. No connexion, it seems, can be traced by these experiments, between the numbers of bacteria, spores, &c., present in the air (at Calcutta), and the occurrence of diarrhœa, dysentery, cholera, ague, or dengue; nor between the presence or abundance of any special form or forms of cells, and the prevalence of any of these diseases.

In alluding to the subject generally, *Nature* says:—"Although these observations may not appear to encourage the hope of success in discovering the presence of atmospheric particles connected with the origin of disease, it must not be forgotten that they only refer to bodies distinguishable from one another *whilst in the air*, the possibility remaining that many of the finer molecules present in it are really of different natures, and may yet be distinguished from one another by means of their actions or developments. Many interesting questions are suggested in connexion with the fact of the presence of such considerable numbers of living cells in the air. What becomes of them when drawn into the respiratory cavities of animals? Is their vitality destroyed, and if so how are they got rid of? Are they ever capable of undergoing any development within the organism, and do they then exert any prejudicial influence on the recipient? These and similar questions can only be answered by means of patient and extended experiment; but even such imperfect and superficial observations as the present will, I trust, serve a useful purpose in clearing away a few of the preliminary obstacles from the path of investigation."

THE ENGLISH GLASS TRADE AND FRENCH DUTIES.

IN consequence of the heavy duties levied by the French Custom-house on English manufactured glass, particularly upon glass used for building purposes, an influential deputation of English manufacturers, introduced by Mr. C. M. Palmer, met at the Foreign Office on Wednesday a representative of the French Minister of Commerce, for the purpose of urging upon the French Government the desirability of obtaining a reduction of the heavy duties on glass imported from this country into French ports.

Mr. Palmer, who is President of the English Glass Association, and who spoke in French, urged the importance of at once reducing the duty upon window glass, which was a necessary of life. Other gentlemen followed in English, and the French representative assured the deputation that their remarks would receive every attention from his Minister of Commerce.

The English Foreign Office, it is stated, were rather surprised to learn that French builders were so dependent upon England for window glass; and why Mr. Cobden, in his treaty, did not hold out against the heavy duty, is a query.

"ARCHITECTS AND THEIR LIABILITIES."

SIR,—I fully agree in your remarks in your last issue, and think with you that the profession should share the expense of the "proper reconsideration" of so extraordinary a verdict.

I am sure, sir, you will not mind the trouble of acting as treasurer, and I believe you will find we shall all give you something to do.

I shall have much pleasure in sending you 5*l.* 5*s.* as my contribution. B. F.

Architectural Museum. — Mr. Skidmore lectured on Saturday last as arranged, Mr. E. B. Denison in the chair. We postpone our report at the lecturer's request.

MITFORD CASTLE.

THIS is one of the most remarkable and most ancient of the Northumbrian castles. It is situated about two miles above and west of Morpeth, on the right bank of the Wansbeck, which here makes two very sharp bends, the larger and higher of which include the castle, the church of St. Andrew, the new Hall, and the ruins of the old one. The church, the nave of which was long roofless, has been repaired, and is now in good order. It is the burial-place of the ancient barons and modern lords of Mitford. The chancel is Early English; the nave rude but good Norman, with a pointed south door in the same style. The old Hall, of which a tower is standing, was a Tudor building, constructed by the Mitfords, in part from the materials of the castle. The present Hall, the Mitford residence, is modern.

What remains of the castle occupies the summit of a knoll of sandstone rock, rising about 70 ft., on the north side abruptly, and elsewhere more or less steeply, from a marshy meadow, which on the north, east, and west is encircled by the folds of the Wansbeck, and on the south by a sweep of a tributary stream, which joins the river just below the castle. Each watercourse flows beneath a steep and high concave bank, thickly wooded, and the result is a sylvan amphitheatre of great seclusion and much beauty.

The castle knoll, at its summit, is about 80 yards across, irregularly circular. Along its brow runs the *enceinte* wall of the place, much broken down, but which seems to have been about 20 ft. high and 7 ft. thick. It may be traced all round, save at one point on the south face, where it is encroached upon by a quarry opened for the materials of the new Hall in 1810. Towards the north the wall is tolerably perfect, though more or less riven, and without its battlements. The inclosure is now an orchard.

The northern portion of the area is somewhat higher than the rest, and has been parted off by a cross wall, creating an inner ward, of small dimension, semicircular plan, and considerable strength. In this ward stands the Norman keep, a square of about 36 ft., but having its north side in two oblique faces, forming a salient. It has, therefore, five sides, a rare and certainly original departure from the usual Norman plan. The walls are about 7 ft. thick, and the interior area 22 ft. 6 in. square. This space is divided by a cross wall, north and south, into two equal parts, each barrel-vaulted, with a plain round-headed arch springing from a plain chamfered abacus. The north face of each chamber is oblique, to match the exterior salient. Of these chambers, one has a loop in the north gable, and the other, in the corresponding place, two small stone spouts, about 3 ft. from the floor, as though for the admission of water. Both chambers are ruined at the south end.

All the keep above the ground-floor walls is destroyed, and the rubbish conceals the exterior wall face, but the whole is clearly of excellent ashlar. From and within the west wall, a small mural stair descends, turning the south-west angle to a door in the south wall, opening into the west vault. This door has a flat segmental arch. The outer entrance seems to have been in the west wall in the floor above the basement. It is said that an exterior stone stair is concealed by the rubbish. This keep stands upon the rock, here perhaps 20 ft. above the rest of the area. It blocks up the triangular, or rather segmental inner ward, standing about 50 ft. from one angle, and 30 ft. from the other. Its salient extends to within 10 ft. of the northern, or corresponding salient of the ward, and its southern face is about 6 ft. within the cross wall. In the curved outer wall of this ward, towards the north-west, is a very remarkable window recess, 8 ft. broad, and of the same height, to the plain Norman abacus, whence springs its round-headed arch, over which is a hood-moulding of the same pattern, the only attempt at ornament. The wall here is 8 ft. thick, but as the outer 2 ft. are not original, the window-case is gone. It was probably of two lights, and opened upon the cliff.

Close south of this window, in the inner face of the same wall, are a number of curious holes, irregularly placed, more or less rounded, as though half a soda-water bottle had been thrust into the green mortar. They occur at the joints, and the best marked are where three joints meet. They are certainly not putlog holes, being too irregular and too shallow.

The inner ward was entered from the outer by a small strong doorway in the cross wall, now much ruined, a few feet west of the keep.

The outer ward had probably a chapel on its south side; many graves, some covered with slabs, and one containing a stone coffin, having been laid open when baring for the quarry. In the west wall is a good plain Caernarvon-headed postern door of 5 ft. opening, below a pointed relieving arch. The main entrance to this ward was on the east side, near the inner ward wall, and commanded by the keep. The gateway, said to have been 15 ft. deep, is now a ruin, but it opened upon a small platform, a little lower than the ward, and which was defended by a wall, under cover of which the road wound up from below. Some broken ground on this side is said to indicate an ancient quarry, probably that employed when the castle was built.

On the north-west quarter was also a spur from the hill, but lower and narrower than the former one. This has been converted into a thin falciform bank, concave to the castle, by the cutting of a deep ditch in its rear, probably to provide a covered way to the postern, up which cattle could be driven with safety.

The castle hill seems to have been girt, a few yards from its base, by a wet ditch, in part artificial, which covered its north-west and south sides, and communicated at each end with the Wansbeck, which completed the circle on the east side. Whether there was a wall within the ditch is uncertain, probably not, but it was guarded towards the north-east by a gatehouse and enclosed space, in front of which, below the present bridge, was the old fosse-bridge, by the tenure of guarding which Walter de Swinhowe, in the reign of Edward III., held forty acres of land.

A knoll so defined as Mitford, so secluded, and so protected by a river and by marshy ground, was likely to have been a British camp as well as a Saxon or English dwelling-place, and there is high probability of the truth of the tradition that asserts the Barony of Mitford to have been held in the reign of the Confessor by John of Mitford, whose daughter Sybil is said to have carried it in marriage to Richard Bertram, a follower of the Conqueror, and of the stock of Baliol. The first recorded lord is however Roger Bertram, who held the Barony in 1155, and certified to its having been held by his father and grandfather. At that time the Barony extended over five parishes, and received payment of castle-guard from nine manors, itself paying scutage to the castle of Newcastle.

The Bertrams who, like the Baliols, bore an orle for their arms, retained Mitford for eight generations, when Agnes, their heiress, sold the estate in 1275 to Alexander de Baliol, from whom it passed by various changes to de Valence, and thence with part of his estate to the Earl of Athol, one of his heirs general. There remained, however, in the district, a family who bore the surname of Mitford, and claimed descent from a brother of John, whose daughter married the Bertram. Their representative, William, in the tenth generation, held lands in, and his son was actually of Mitford, and seems to have recovered the castle, and to be the direct ancestor in the male line of the present Mr. Mitford, of Mitford, and of his distant kinsman Lord Redesdale.

The castle, though of no great magnitude, played, from its position and strength, rather an important part in Border warfare. William the Lion, who reigned from 1165 to 1214, dated a charter from hence, 28th December, 1215. King John is said to have burned the vill, though whether he took the castle is unknown. The public records, however, make him visit Mitford from Berwick in 1216, and stay there the 24th, 25th, and 26th January, going on the latter day to Newcastle. Alexander, King of Scotland, failed to take the place in May, 1217, when he lay in leaguer before it for seven days. Local history is silent concerning it during the active reign of Edward I., but in the wild times consequent upon Bannockburn, a notorious Border Freebooter, Sir Gilbert Middleton, made Mitford his stronghold, and here imprisoned Henry Lord Beaumont, while his brother, Lewis Bishop of Durham, was shut up in Morpeth Castle.

The castle, by its present condition, affords evidence of the vicissitudes it has undergone. Still, ruined as it is, careful observation finds much from which its original plan, and even part of its details, may be ascertained. Its general plan, the keep, and the most part of the *enceinte* wall, are evidently original, and Late Norman, probably the work of Richard Bertram, early in the reign of Henry II. The postern is of course later, either Early Edwardian or of the reign of Henry III. It is unusual to find so small a keep divided by a cross-wall, or to find any Norman keep with an original vaulted basement, though of this there is apparently an example in the Late Norman Keep of Norham. The salient on one side is unknown elsewhere.

A good ground-plan and photographs on a large scale of the masonry are much needed, and a very moderate amount of excavation in the inner ward would probably throw light on the original structure of the keep. In point of recorded history the very complete account of Mitford, given in "Hodgson's Northumberland," leaves nothing to be desired; it is only to be regretted that a corresponding industry and critical acumen have not been brought to bear upon its architectural remains. G. T. C.

HORSE-SHOEING AND THE PAVEMENTS.

THE state of our streets is a matter of importance in which everybody is concerned: it is not merely a question for ratepayers; but for every man, woman, and child who has to pass from one house to another, it is a material consideration whether the paths and roads present a clean surface for walking, or are covered with a greasy compound of water and powdered dust and granite. It is an important point whether a lady can safely enter a Hansom-cab without fear of soiling her dress against the wheel, or whether every vehicle that passes her is to send a shower of particles of mud on all sides as it drives by. The vastly increasing traffic of London and other great cities has demanded that some more lasting material for the roadways should be employed than is presented in the natural state of the ground. Mr. MacAdam, whose name is immortalised by its connexion with all the principal roads of the country, invented or applied the process of coating the roads with a layer of granite chips, which, when compressed, form a firm and fairly even surface. In the still more crowded thoroughfares of London, every one is familiar with the still more solid paving of blocks of granite of the size of a brick, forming the "stones" by which the cabbies of a few years ago were wont to calculate their distances. But neither of these modes of road-making is perfect. Both are attended with a considerable amount of noise; both are more or less "rugged," and the granite has the reputation of presenting a bad foothold for horses, especially when dry, while in wet weather the Macadamised roads are very rotten, and easily worn into mud. During the last two or three years two new modes of paving have come into general use. Blocks of wood, prepared in various ways, have been employed instead of granite, and asphalte, a bituminous rock, heated and laid on the surface of the ground in a semi-liquid state, has taken the place, to a certain extent, of the "carpet" of broken flints, or granite chips. The advantages of both these inventions lie in their greater cleanliness and in the diminished noise which is caused by traffic passing over them.

Any one driving through certain streets in London will meet in his course with a succession of very varied travelling. Passing from the moderately elastic, and somewhat noisy and uneven macadam, he will come to the inelastic granite, where the two last characteristics will be heightened, and soon pass on to the springy and nearly noiseless wood pavement. On reaching the asphalte, however, the perfection of travelling will seem to be reached,—a perfectly level surface, over which the wheels noiselessly glide, and which does not degenerate into mud in the winter nor dust in the summer; such will probably be the feelings of the traveller on two wheels throughout the varied streets of our busy metropolis.

But, then, the feelings and experiences of the horses have to be taken into account, and recent observations have shown objections to both these improved pavements, to the removal of which attention is now being directed. In the meantime, it is worthy the attention of the owners of horses whether the danger of injury from falling, either on asphalte or granite, could not be obviated or diminished by improved methods of shoeing. A shoe is, at the best, but an artificial innovation; if it is fitted to the foot it is highly beneficial, by saving the hoof from wear and injury; but, generally speaking, the *hoofs* are fitted to the *shoes* by being pared down, and burnt away by applying a heated shoe to the foot. In the cause of humanity this

practice ought to be abandoned, and it is to the interests of the owners of horses to discontinue it. A shoe prepared with a substance which will prevent slipping on asphalte in its most dangerous state has lately been invented, and appears to do all that is required of it; but the existing pattern of shoe may be made much more safe if horses are shod on scientific principles, and if the natural formation of the hoof is consulted, and assisted, instead of being ruthlessly destroyed by careless farriers. In the question of street-paving, the consideration should be not the maintenance of uncomfortable roads, because a smooth pavement is not adapted to improper modes of shoeing horses, but rather the attainment of the most perfect shoe, so as to admit of safe travelling on level roads.

INDIVIDUALISED SCULPTURE IN LONDON,—SOME PHASES OF IT.

AMID the almost endless multitude of addresses, lectures, papers, and disquisitions generally, that are poured into the public ear by those who move and guide the art-world, it must surely be a matter of surprise that in them no *systematic* attempt has as yet been made to *analyse* the fine art in London, and to point out its distinctive qualities. We here allude more especially to the *open air* art, to the public statues, and to those specimens of the sculptor's art to be found every here and there attached to, and forming parts of, buildings. It would be difficult to overrate the importance of this subject, for how can the public mind be so well instructed in matters artistic as by the great fact of some one or more specimens of it meeting the passer-by at every turn? This was the way in past days. Art was for the public, and the wayside; and even the "Streets of Tombs," in heathen times, afforded continually recurring spots on which art could and did find resting-places. Passing to the Gothic days, and missing much in such towns as Rouen, Nuremberg, Paris as it was, and in a host of others all over Europe, we find that every house was a new design in itself, and was as often as not full of expressive sculpture and carving, expressive of the purpose to which the house was devoted, and with the coat of arms or sign of the owner on it. Nothing could be more fertile in principle than the Mediæval system of art action; every idea was *utilised*, and, so to speak, materialised; and to run was necessarily to *read*, for you could hardly do otherwise. Every old Continental town shows this unmistakably. Nor, we may make quite sure, was this ever-present art confined to the Continental cities. In the London of the Middle Ages must the streets, however much wanting in other ways, have been full of what may well be termed the picturesque in so far as house arrangement went, and of the sculpturesque in the fullest degree. The houses, each one an individuality, differed from its next-door neighbour, and many of them, as we know from contemporary records and prints, and even from some few actual remains, were ornamented with sculptures and carvings both inside and outside. A Mediaval street was a picture in itself, and full of fine art, and the mind of the passer-by was touched and often enough instructed, even if his body suffered some inconvenience, as, without doubt, it often did. We wish most heartily that we could refer to some specimens of the secular sculpture in London of the early centuries; but what is left is, alas! so little that we may but too soon exhaust the list of it. First, in the magnificent roof of Westminster Hall, the fine wood-carving of the figures which terminate the hammer-beams may be noticed and studied, and then the carving on the heraldic shields, so very boldly and cleverly cut. It would be difficult to find in London a better art-study than this roof, and the evidence it affords of the executive power of the workmen, at the time it was executed, is as complete and suggestive and individualised as well can be. Every part of it exhibits the hand of the workman. We might here suggest to those who are now thinking over a coming exhibition of timber and timber construction in the next year, to add to it a cast of one of these end beams, with its terminal figure and shields. It would be interesting to see the work a little closer than is possible from the floor of Westminster Hall.

Another most noteworthy example of the sculptor's art in this fine hall are the figures in the niches in the south wall—right noble specimens of the sculptor's art. They are six in number, three on each side of the archway leading into St. Stephen's Court, or Hall, on the site of the famous chapel that was there in times of yore. There were three others situate midway between these; but they were removed when the hall was altered, and are now, we believe, either at South Kensington, with the collection there, or at the Architectural Museum with other fragments from the old chapel. Quite a little story of antiquarian and artistic interest, by the way, is attached to these figures, worth perhaps one day noting. These really magnificent "figures of kings" are in fine preservation, and though the crowns be broken, yet the heads and faces remain. One of these heads, with its bushy hair, has a strange Gothic sort of resemblance to the Jupiter of Phideas. It is well worth study and drawing from. It shows how fine touches of noble nature make "the whole world kin," and will bring together even those so far apart as the antique Greek and the old Goth. It seems a pity to have disturbed these; and perhaps the time may yet come when the true idea of "restoration" will restore them to their own proper place. Westminster Hall is historic ground, and the noblest room perhaps in all Europe. It is full of artistic work, and was fuller. Their sculptor understood his work.

We have here purposely omitted cathedral and church work as deserving of other special notice, and would fain seek for other evidences of ancient secular sculpture yet remaining; but, truth to say, old London is gone, as far as house-building and secular building are concerned; and it would be difficult, if not impossible, to find visible to open eyesight another example of it. The total disappearance of the old sculpture in London is a singular and notable fact, and lamentable to think of. A Mediæval street yet in existence, untouched and unrestored, would be a remarkable sight, and would be a museum of antiquities in itself, and a studio for architects and sculptors and carvers. But this not being so, we must need come down to the Renaissance days, in its commencement, under Inigo Jones and Christopher Wren, and their more immediate successors, for further examples of the sculptor's and carver's individualised work, and some of these are the most remarkable art objects London can as yet boast of. They cannot be said to have had justice done them. And, first, let us note, not in the order of time, the admirably-designed and equally admirably executed animal forms at the base of the Monument, on Fish-street-hill. They are four in number, one at each corner, and represent the conventional winged dragon. They are not all alike, but are all different in attitude, and, with open jaws, would seem to inhale the burning air of the burnt-out city, as the huge reptiles are said to do on the banks of tropical rivers,—admirably conceived and executed. These fine conceptions of animal forms, quite worthy of the best of Gothic animal designing and cutting, were the work of one Edward Pierce, jun.—all honour to him as a true and able artist-workman! They cost 50*l.* each. It would be a little curious to ascertain what such "ornaments" would now be estimated at, and who could be found best to emulate the feat, not by the attempt to *reproduce* these, but by going to work in the same way, and by the—"go thou and do likewise" principle. Wren was a good architect, and full of artistic and mechanical resource, but in no one thing did he better display his powers as an artist-architect and working-man than by his finding out the true men who could do for him what he could not do for himself—the carved and sculptured work in his buildings. This monument of his shows it, and so does St. Paul's, and so do Wren's churches everywhere. The carvings of festoons, with the Royal and City Arms, and trophies between those figures, are cleverly managed, and sure to keep the dragon forms together, and to chain them to their places. It may be noted that the Great Fire of London occurred in the year 1666, on the "fourth day of the nones of September," and originated eastward of this column 202 ft., the height of the column. The sculptured panel facing westward, is not such fine work as the dragons by a long way, though it was executed by Caius Gabriel Cibber, and represents allegorically the destruction and restoration of the City of London.

It is impossible to glance, however slightly, at this important subject of London statuary art without notice of one or two modern works, which have all but, if they have not quite, come to grief from some unfortunate accident or other. Fame does not always depend upon true merit, and it is quite certain that true merit in a work of art cannot *always* save it. Marochetti's fine equestrian statue of Richard the Lion-hearted, in Old Palace-yard,—not a little awkwardly placed, by the way,—was all but lost to London at one time. It did not seem as if a place any where could be found for it. Its merits were seen, and pleaded for it at the time. It is a noble and idealistic idea of the warlike monarch, and a something to pause for a moment and look at. It is well worthy of a better pedestal; a simple block of rough granite, may be. And here may it be noticed that wide open spaces do not seem to be the best of places for statues, whether equestrian or no. They are apt to look like *toys* in the wide empty spaces; court-yards seem to be the places specially fitted for them. There is *there* a certain sense of quietness and repose; and the surrounding buildings, even if they be not altogether architectural, form a sort of background and framework for a good statue, be it what it may. Modern architectural designing ignores to a great extent these inclosed courts. A great mistake; a good deal is lost thereby, and the easiest road to the picturesque in street architecture missed. This statue is one of the Italian sculptor's best works, and was executed at a fortunate moment. We feel a little personal interest in it, from kindly recollections of the artist-sculptor himself, and his quaint "studio."

We cannot, of course, attempt now to go through, one by one, all over London the statuary and carving remarkable for individuality of treatment, and work and expression; and we have sited the Marochetti figure in proof of the art-power of the day, and as showing that this individuality of art-power is still rife among us. And there is yet another work which we would gladly see again in some place or other. We refer to the lamp-standards at one time "on view" opposite the Temple Gardens, on the Thames Embankment. The subject of them, as will, perhaps, be recollected, represented two figures, well modelled, in the act of climbing the lamp-standard and lighting the lamp with a torch, or rather struggling to light the lamp. It was a clever idea well wrought out. These standards, however, were removed to make way for those now on the Embankment, and the last we saw of them was on the waste ground close to the goods station of the London, Chatham, and Dover Railway. They would seem to have been thrown aside as rubbish. Would it not be as well to put them up somewhere—where they may be seen—in the place of a common street lamp-post, if nought better offers?

BUILDING IN ASHANTEE.

IN building a house in Coomassie, a mould is made for receiving the clay by two rows of stakes and wattle-work, placed at a distance equal to the intended thickness of the wall. The interval is then filled up with a gravelly clay mixed with water, with which the outward surface of the framework is also thickly plastered, so as to exhibit the appearance of a thick mud wall. The houses have all gable-ends, and three thick poles are joined to each; one from the highest point forming the ridge of the roof, and one on each side from the base of the triangular part of the gable. These support a framework of bamboo, over which an interwoven thatch of palm-leaves is laid, and tied with the runners of trees, first to the large poles running from gable to gable, and afterwards (within) to the interlacing of the bamboo framework, which is painted black and polished, so as to look superior to the usual rude ceiling of barbarians. The pillars which assist to support the roof and form the proscenium or open front, are thick poles, afterwards squared with a plastering of swish. But the captains alone are allowed to have pillars. The steps and raised floor of these rooms are clay and stone, with a thick layer of red earth, which abounds in the neighbourhood, and these are washed and painted daily with an infusion of the same earth in water. This earth has all the appearance of red ochre, which very probably it is, as an abundance of iron ore is found in the country.

While the walls are still soft, there are formed moulds or framework of the patterns in delicate slips of cane, connected by grass. The two first slips (one end of each being inserted in the soft wall) project the relief, commonly *mezzo*; the interstices are then filled up with the plaster. The poles, or pillars, are sometimes encircled by twists of cane intersecting each other, which,

being filled up with thin plaster, resemble the lozenge and cable ornaments of the Anglo-Norman style. The quatrefoil is very common, and by no means rude, from the symmetrical bend of the cane which forms it. Occasionally may be seen a few pillars (after they have been squared with the plaster) with numerous slips of cane pressed perpendicularly on the wet surface, which, being covered again with a very thin coat of plaster, closely resembles fluting. In forming an arch, the builders insert one end of a thick piece of clay in the wet clay of the floor or base, and bending the other over, insert it in the same manner, the entablature being filled up with wattle-work plastered over. Arcades and piazzas are common. A whitewash, very frequently renewed, is made from a clay in the neighbourhood. Of course the plastering is very frail, and in the relief frequently discloses the edges of the cane, giving, however, a piquant effect auxiliary to the ornament. The doors are an entire piece of cotton-wood, cut with great labour out of the buttresses of that tree; battens variously cut and painted are afterwards nailed across. The locks used are from Houssa. Where a first floor is raised, the under one is divided into two by an intersecting wall to support the joists for the upper room, which are generally covered with a framework, thickly plastered over with red ochre. Few attempts are made to make a flooring with plank, but when the natives do they use cotton-wood, shaped entirely with an adze, and placed so as to look like a ship's deck. The windows are open woodwork, carved in fanciful figures and intricate patterns, and painted red; the frames are frequently cased in gold, about as thick as cartridge-paper. What often surprises travellers in this most remarkable country, and is not the least of the many circumstances deciding the great superiority of the Ashantees over the generality of negroes, is that every house has its convenience, besides the common ones, for the lower orders outside the town. They are generally situated under a small archway in the most retired angle of the building, but not unfrequently upstairs, within a separate room like a small closet, where the large hollow pillars also assist to support the upper story: the holes are of small circumference, but dug to a surprising depth, and boiling water is daily poured down, which prevents the least offence. The rubbish and offal of each house are burnt every morning at the back of the street, and the inmates are as cleanly and particular in their dwellings as in their persons.

The late king made frequent inquiries about the architecture of England, of which some drawings were given to him. He or his father was very fond of referring to a project which he declared he would carry into effect directly the Gaman war was over. This was to build a house for his own immediate residence, roofed with brass pans, beaten into flat surfaces, and laid over an ivory framework, appearing within. The windows and the doors to be cased in gold, and the door-posts and pillars of ivory. Whether it was that the king was encouraged in this extravagance by the Arab traders who found their way to Coomassie, or whether it was a scheme after his own heart, it is hard to say; but it is certain that he was disposed towards magnificence and novelty, and was heartily bent upon carrying out this new scheme. The dwellings of the nobles and great men are built in a hollow square, into which the female apartments open; the roofs project over the sides fronting the street, under which there are lounges, and here the master of the house receives his visitors.

LAMBETH PALACE LIBRARY.

ARCHDEACON TROLLOPE, president of the Associated Architectural Societies, has lately presented a complete series of their reports and papers to the Archiepiscopal Library, Lambeth Palace. The proceedings contain valuable architectural and archæological descriptions of churches and antiquities in the counties of York, Lincoln, Worcester, Leicester, &c.; and as some of the volumes are becoming very scarce, the donation is one of more than ordinary importance. Our readers will remember that the Lambeth Library is open every Monday, Wednesday, and Friday, from ten a.m. to three p.m., and that it contains some choice illuminated MSS. of the Anglo-Irish, English, French, and Flemish schools of art, besides many early printed books of great rarity.

THE WATER SUPPLY OF DUBLIN.

THE INSTITUTION OF CIVIL ENGINEERS.

ON February 24, Mr. Thos. E. Harrison, president, in the chair, the paper read was "On the Water Supply of the City of Dublin," by Mr. Parke Neville, C.E.

The water supply to the city of Dublin was for several centuries derived from the river Dodder. In 1775 this source was found to be insufficient, and the corporation entered into contracts, for a term of sixty years, with the Grand and Royal Canal Companies for a supply equal to from six to seven million gallons per day. Under the terms of this contract the city was mainly supplied up to the time when the Vartry water was introduced. The level of the water in the old city basins, from which the canal and Dodder waters were distributed, was only from 76 ft. to 78 ft. above the Ordnance datum, while some portions of the city of Dublin were on an elevation of about 100 ft. The water also was hard, and subject to pollution. From 1850 to 1857 the question of obtaining a better supply was constantly under consideration. The plan most advocated was to take water from the canals from a high level, and to construct a large distributing reservoir; but the corporation, after promoting a Bill in Parliament to obtain a supply from the river Liffey, near Newbridge, called the Coyford scheme, ultimately agreed that the whole question should be referred to a Royal Commission, and Sir John Hawkshaw, Past President Inst. C.E., was appointed by the Government as commissioner. He held an inquiry in Dublin, in October, 1860, and examined into the merits of all the schemes, the result being that he recommended the river Vartry as the best source. In the session of 1860-61 an Act was obtained for carrying out the works in accordance with the Royal Commissioners' Report, and the works were commenced in November, 1862, and finished in 1868.

The source of the river Vartry was at the base of the Sugar-loaf Mountain, in the county of Wicklow, and it flowed in a southerly direction, through a thinly-populated country, into the sea at the town of Wicklow, being a distance of 17¼ miles. The geological character of the country was clay slate. The water flowing off the catchments was peculiarly soft and pure, and, by analysis, was found to be almost identical in character with the Loch Katrine water with which Glasgow was supplied. The rainfall over the district, from observations during the past thirteen years, varied from 40 in. in depth in 1873, the driest year, up to 60·87 in., the greatest rainfall registered; the average might be taken at about 50 in.

The place selected for the storage reservoir was near the village of Roundwood, about 7½ miles below the source of the river. The bed of the river at that point was 632 ft. above Ordnance datum, and the drainage area above it was 14,080 acres. The embankment across the valley was at the deepest point 66 ft. high, and it was 1,640 ft. long on the top. The greatest depth of water impounded was 60 ft., and the average depth 22 ft. The area of the reservoir was 409 acres, and it was capable of holding 2,400 million gallons of water, equal to 200 days' supply for the city of Dublin and suburbs, taking the population at 400,000, and allowing 25 gallons per head per day for domestic and public use, and 2,000,000 gallons for manufacturing purposes. The level of the water in the reservoir when full was 692 ft. above Ordnance datum, and 580 ft. above the highest parts of the city of Dublin. The corporation had acquired by purchase all the water-rights of the mill-owners and riparian owners; accordingly no compensation water had to be given, the entire property in the water being vested in the corporation. The quantity of the rainfall discharged over the byewash was about two-fifths of the entire fall, so that by constructing additional reservoirs the storage would be increased 60 per cent.

Two mains, 48 in. and 33 in. in diameter respectively, were carried through the bank in a tunnel excavated out of the rock and arched over. The 48-in. main, which terminated in the bye-wash, was a provision solely for the purpose of being able rapidly to lower the water in the reservoir if necessary. The 33-in. main conveyed the water to a circular receiving basin, situated at the outer toe of the embankment, and from this basin the water was distributed by side canals on to seven filter-beds. After being filtered the water was collected into two pure-water tanks, from whence it was carried for about 700 yards in an iron pipe, 42 in. in diameter, with a fall of 6 ft. per mile, until it reached the tunnel, into which it was laid for 120 yards. The tunnel was 4,367 yards long, and conveyed the water from the natural valley of the Vartry, under a range of hills separating that valley from the districts sloping towards the sea to the east. The natural course of the Vartry was from north to south, but by curves in the tunnel it had been turned to flow north towards Dublin. This tunnel was extremely difficult to execute, from the character of the rock bored through and the quantity of water met with. It was from 5 ft. to 6 ft. high and 4 ft. wide. To facilitate its execution, twenty-one shafts were sunk, varying from 90 ft. to 180 ft. deep. The gradient of the tunnel was 4 ft. in a mile. At Callow Hill, the northern or Dublin end of the tunnel, there was a circular relieving tank, 90 ft. in diameter, and a gauge weir for registering the quantity of water flowing into the city. From this tank, the surface water in which was 602 ft. above Ordnance datum, a main, 33 in. in diameter, conveyed the water to the distributing reservoir at Stillorgan, a distance of about 17½ miles. There was a self-acting stop-valve at the junction of the main with the tank, to prevent flooding in case of a pipe bursting. Three tanks relieved the pressure at different points, viz.: at Kilmurray, level above datum, 472·2 ft., distance from Callow Hill, 11,809 yards; at Kilcroney, level above datum, 414 ft., distance from Kilmurray, 5,121 yards; and at Rathmichael, level above datum, 341 ft., distance from Kilcroney, 6,444 yards; which latter was 7,431 yards from the Stillorgan Reservoir. At each of the tanks there was a self-acting drop-valve, to shut off the water in case of a pipe bursting. The pipes had been laid for 9,894 yards along the public roads, and the rest 21,048 yards, across the country, which, for part of the distance, where the Dargle River, the Cookstown Valley and the County Boundary Valleys had to be crossed, was of a difficult and rugged character.

The two distributing reservoirs at Stillorgan were 4 miles 5 furlongs 150 yards from the city boundary at Eustace bridge. The top-water level in the upper one was 274 ft. above Ordnance datum; it contained 43,057,414 gallons, and was of the average depth of 20 ft. The lower one was 271 ft. above Ordnance datum, or about 250 ft. above the quays in Dublin, and contained 43,166,518 gallons, the average depth being 22 ft. The total quantity of land occupied by the reservoirs, caretakers' residence, &c., was about 26 acres. At the south-east corner of the lower reservoir there was a handsome screen chamber, of ashlar granite, octagonal in plan, and 49 ft. in internal diameter; the depth of the water was 27 ft., and to the floor-line 31 ft. 6 in. The pillars and framework were of cast iron, and the screens had an area of 1,500 square feet, and were fitted with copper wire gauze having thirty strands to the inch. Seven 33-in. valves, two 27-in. valves, and one 15-in. valve in this chamber regulated the distribution of the water. There was also a scour pipe and valve, 12 in. in diameter, and the overflow was through a vertical pipe, 27 in. in diameter, with a bell-mouth. The valve gearings were all fixed to the side walls, leaving the centre of the chamber quite clear. All the valves in this chamber and on the large mains were worked by slow-motion gearing, to prevent the possibility of closing or opening them too rapidly; and indices, graduated to inches and turns of the screws, were attached to all to secure accuracy in working. Two mains, 27 in. diameter, conveyed the water from the screen chamber to the boundary of the city at Eustace Bridge. They were carried through the embankment of the reservoir in a culvert. At the toe of the embankment a vaulted chamber was built, in which self-acting stop-valves were placed. The mains were carried along the Stillorgan road. At Merrion avenue, at Simmins-court, and at Eustace Bridge, groups of valves, in vaulted chambers of easy access, enabled the water to be turned from one main to the other, so that in case of accident a short section of the injured main could be emptied for repair without interfering with the supply to the city; and at those points also branches were taken off for the supply of the Pembroke and Blackrock townships. On the city side of Eustace Bridge, at Leeson-street, the 27-in. mains separated right and left, and were carried through the streets (being gradually diminished in size to 18 in.), until they were united on the north of the city, forming a zone encircling the central parts of the city, and from this zone all

the service mains diverged. Screw valves at the intersection of the streets enabled the water to be turned off or on, either to repair the mains, or to concentrate the pressure in case of fire. Hydrants were placed in every street at intervals of 100 yards, and the system was so perfect, that since the introduction of the Vartry water no steam or hand fire-engine had been used to extinguish fires. The supply of water at high pressure, to be obtained from the mains by simply attaching a stand pipe, with hose, &c., to the hydrants, had proved sufficient to throw powerful jets of water over and on to the highest building, rapidly extinguishing fires, and preventing them from spreading. A length of 51 miles of new mains had been laid within the city boundary, and 60 miles of the old mains had been utilised. The number of hydrants was twelve hundred and nineteen.

The corporation supplied water in bulk to eight extra municipal townships, viz.:—Pembroke, Blackrock, Kingstown, Dalkey, Ballybrack, Bray, Kilmainham, and Clontaf, for which they were paid at the rate of from 3½d. to 5½d. in the pound on the valuation of the townships; the quantity of water the corporation were bound to supply being at the rate of 20 gallons per head of population per diem.

The total cost of the works, including every item for compensation, purchase of lands, law and Parliamentary charges, also the old pipe-water debt of 72,000*l.*, had been 610,000*l.* or at the rate of 1*l.* 16*s.* 6*d.* per head of the population.

THE NEW SCHEME OF THE ENDOWED SCHOOL COMMISSIONERS FOR DULWICH COLLEGE.

IT will be remembered that about two years ago, in 1872, there was a considerable amount of agitation caused by a scheme put forward by the Endowed School Commissioners for the future management of Dulwich College. The scheme, amongst other things, contemplated the appropriation of a large portion of the income and capital of the Dulwich College estate, for the purpose of founding and erecting new schools in Camberwell and other parishes interested in Alleyn's Charity, the scheme including a proposal to sell property to the extent of 80,000*l.*, in order to carry out this object. A strong opposition to the scheme was manifested in several quarters, and it was urged against the scheme, on the advice of counsel, that under the peculiar terms of Alleyn's bequest it would be illegal for the governors to dispose of the property as proposed by the Endowed School Commissioners. The result eventually was that the Commissioners withdrew their scheme, with the understanding, that after reconsidering the subject they would draw up a revised scheme. This they have done within the last few days, and the scheme as amended has now been published for the examination of those interested.

The new scheme differs from the former one, in so far as the sale of the college estates for building and maintaining schools in the several parishes is concerned, but the principle of establishing and supporting such schools out of the income of the college estates is retained. According to one clause in the scheme the income of the college is to stand charged with a capital sum of 70,000*l.* for the building and maintaining of Alleyn's High and Middle Class Schools for girls; for Wilson's schools at Camberwell; for St. Saviour's Free Grammar School, Southwark; for St. Botolph's Bishopsgate Ward Schools; and for Alleyn's St. Luke's Schools; the sums appropriated to the several schools respectively being 15,000*l.* to Alleyn's Schools for girls; 15,000*l.* to Wilson's Schools, Camberwell; 10,000*l.* to St. Saviour's Free Grammar School, Southwark; 10,000*l.* to the Bishopsgate Ward Schools; and 20,000*l.* to Alleyn's St. Luke's Schools; in addition to 1,000*l.* a year each out of the income of the charity to Wilson's, St. Saviour's, Bishopsgate, and St. Luke's School; and 500*l.* to each of the girls' schools. Other clauses provide for the minimum and maximum fees to be paid at these schools. Further clauses provide for separating the chapel from the College, and making it available for the parish use, and, if necessary, altering, enlarging, or rebuilding it out of the general income of the College. A further clause provides that in the event of a new chapel or church being required, the management of the present chapel shall revert to the governors, and that, in addition, they are empowered to pull it down. There is a proviso that if it remains standing the fabric is not to be devoted to secular uses, unless with the approval of the bishop of the diocese. A further clause provides for the retention of the eleemosynary endowment and the almshouses. Part 8, containing several clauses, is exclusively confined to the future arrangements of Dulwich College proper, and provides that the endowment of the College for the purposes of supporting the buildings and maintaining the grounds is to be 2,200*l.* a year, in addition to all the buildings and land attached to the school. Another clause fixes the income of Dr. Carver, the head master, at 2,400*l.* a year. A special clause provides for the maintenance of the picture gallery, in order to promote art education. There are several other clauses as to the appointment of chief and representative governors, the course and subjects of instruction under Dr. Carver and assistants at Dulwich College, and several other matters, but those indicated in the foregoing particulars possess the greatest interest for the public. The scheme will, of course, have to be considered by Parliament before being sanctioned, and already there are signs of opposition in several quarters, St. Luke's and some of the other parishes contending that they are entitled to a much larger share of the College endowment fund than the Commissioners offer them.

SCHOOL-BOARD INSTRUCTION.

THE KINDER GARTEN SYSTEM.

THE communication of technical and industrial education can scarcely be considered a duty devolving specially upon the London School Board. If such an object was entertained at all by the promoters of the Elementary Education Act of 1870, it was probably regarded as subordinate and remote, rather than paramount and immediate. While this is so, there is good reason to believe that the Board has lively sympathy with the promotion of technical and industrial education. And as regards the latter, indeed, the Board has powers, under the 28th section of the Act of 1870, "to establish, build, and maintain, Industrial Schools within the meaning of the Industrial Schools Act of 1866, and shall for that purpose have the same powers as they have for the purpose of providing sufficient school accommodation for their district."

Whatever degree of general approval may have been given to Mr. Gladstone's recent manifesto to the country through his constituents, we venture to think that many persons will impute wisdom and moderation to the right hon. gentleman in connexion with his reference to the Education Act. "It appears to me," he says, "that no main provision of the measure can advantageously be reconsidered without the aid of an experience such as we have not yet acquired." This is surely more seemly and becoming than the course taken by some of the new members of the London School Board, who would set at naught the experience of the first Board, who would unsettle much that was settled by their predecessors after the fullest deliberation, and undo what has been done with the most painstaking care.

The commodious school buildings in various parts of London, most of them towering above the surrounding structures, that have been already erected by the Board, or that are in course of erection, are evidence, so far as they go, of the activity at least of the first Board. Evidence of the excellent quality of the educational work—the new era in the history of popular education—that they initiated is given to any one who will avail himself of the privilege of visiting any of the new Board schools that have been opened and are in full working order.

It was, we believe, the laudable ambition of the first London School Board, and it is to be hoped the ambition of their successors, not only to provide sufficient school accommodation and to increase the quantity of teaching power, but more especially to raise and improve its quality,—to interpret generously the term "elementary education," and, with enlightened liberality, to embrace within its scope additional and useful subjects. Short though the existence of School Boards has as yet been, and necessarily limited their action and operations, they have already done something to revolutionise the popular instruction of the country for the better, and are creating valuable experience. In a work on primary instruction written about three years since by a well-known author, he gravely states in relation to the work before the then recently appointed London School Board:—"*The teachers do not exist, and the school-books have yet to be written.*" We are still a long way short of perfection both as regards teachers and books, but it would be idle to deny that there is a growing improvement in each. As regards future supply of teachers it may be mentioned that, exclusive of masters and mistresses, and assistant masters and mistresses, of whom there are nearly 500 now, or about to become connected with the London School Board, about 1,500 pupil teachers are under the Board receiving special training as teachers. With respect to school-books and teaching appliances, the improvements since the time of the last generation have been immense, but at no period have these improvements been greater or more important than during the last few years.

The school management committee of the London School Board are unlikely to introduce novelties in the course of instruction for novelty's sake alone. They expand the course of instruction by the introduction of branches that are of universally admitted value and importance; as, for instance, singing, in which systematic instruction is given to pupils and pupil-teachers. Although they may not with propriety, or hope of success, attempt to give technical instruction proper, they are doing their part, and laying a foundation for it, by introducing free-hand drawing as a branch of instruction and training in the Board schools.

In the same useful direction is their introduction of the "Kinder Garten" system. The Board very properly attaches great importance to thorough and systematic teaching on this system, and have appointed Miss Bishop, who is thoroughly acquainted with, and well qualified to teach it, a special instructor for their schools. For the present there is only one Board-school, (Wilmot-street, Bethnal-green), in which it is attempted to teach the children the Kinder Garten system thoroughly; but in so far as the powers of the special instructor are communicable, judicious means are employed for enabling her to impart them to others. Five classes each week are taken in different parts of London, for the benefit of female pupil teachers and mistresses both of infants' and girls' schools. At each of these five centres a course of instruction, complete in itself, is to be given. The pupil-teachers attending these lessons are themselves taught as a class as the children should be taught in the schools. By this means the series of twelve lessons may be communicated to a thousand pupil-teachers in the course of twelve months; that number being, however, considerably in excess of the female pupil-teachers in London Board-schools.

Those who do not know much of the Fröbel system are apt to regard it with derision; those who understand it best are least likely to undervalue it. His "gifts" of "stick laying," "paper folding," "paper-plaiting or weaving," "pea-work," &c., may seem puerile, but in the hands of a teacher who understands the system and subject thoroughly, the trifling materials employed are capable of giving, in addition to interesting amusement, most useful elementary education and training to the eye and the hand. The box of balls,—blue, yellow, red, green, orange, and purple, the primary and secondary colours,—suffice for an elementary lesson on colour. The form of the ball, with all its sides, parts, or faces alike, a form that the child will distinguish from all others, serves for a first lesson in geometry, supplemented by the exhibition of cubes and cylinders. With their sticks they are taught, amongst other things, to present perpendicular and horizontal lines, and to form acute, obtuse, and right angles, and from their sticks to point out all such lines and angles in the room. Similar uses are subserved in their amusement of paper-folding. In like manner their drawings upon squared slates are a preparatory step to writing. Even elementary modelling is not neglected in the system, which is well fitted to accomplish the important object of educating that organ,—the hand,—the instrument by which the mind is enabled to give expression, materiality, and form to its conceptions, so far as they are applied to the practical purposes of life.

We described the system years ago, and urged its value in the teaching of young children. It is in no overweening spirit of boasting, but with an honest and, we venture to believe, justifiable feeling of satisfaction, that we point to the early volumes of our journal as containing the seeds and early beginnings of much good work now in full swing.

CARVING IN IVORY.*

IVORY is a material upon which the skill and genius of the best artists of all ages have been lavished, and for this reason that it furnishes an admirable medium for expressing the designs and the inspirations of the sculptor. The works of art created out of it illustrate every style and every period of the past, and throw light upon times which otherwise would be absolutely obscure; and in no other material can the student find parallel specimens, as illustrations of sculpture from the days of Imperial Rome to the revival of art, as developed under the great masters of the fifteenth century. One cause of the preservation of the comparatively few ivories remaining among us is that they have not offered to the destroyer the same temptations that were presented in the case of the precious metals.

Ivory has ever stood high in public estimation, and in ages past was treated like gold and jewels as associated with royalty. Although unequal in whiteness to marble, it is superior to marble in beauty of polish. Besides the elephant, other animals furnish a material which must come under the category of ivory, such as the walrus, narwhal, and hippopotamus. To these we must add the fossil ivory, so often used in early carvings, a description of ivory which has not undergone the change generally understood by the word fossil, as it is as much adapted for ordinary use as the ivory procured from living species. Professor Owen tells us that in prehistoric ages a true elephant roamed in countless herds over the temperate and northern parts of Europe, Asia, and America. This was the mammoth. The tusks of these animals are found in great numbers in the frozen soil of Siberia, along the banks of the larger rivers. The story of the entire mammoth, discovered about half a century ago embedded in ice, is known to every one; and so recently as in July, 1873, there arrived in London from Revel a cargo of Siberian mammoth tusks, many weighing 200 lb., their length being 10 ft. 6 in., and the diameter 6 in. to 8 in. African ivory is recognised by its warm transparent tint when newly cut, by scarcely any appearance of grain, and after exposure to air by becoming lighter in colour. As regards the supply of this description, Dr. Livingstone, writing to the editor of the *New York Herald* in 1871, from Central Africa, states that no traders having ever before entered Manyuema, the value of ivory was quite unknown.

Asiatic ivory has its characteristics, one of which is that by exposure to the air it tends to turn yellow. Walrus ivory was used for a long time in Southern Europe in the earlier periods of history. In quality and beauty of appearance this description scarcely yields to that of the elephant. In times of scarcity, besides the tusks of the various animals already mentioned, the bone of ordinary animals was resorted to. This was most especially the case in North Italy. Camel bone is a description occasionally mentioned. To decide the original source of the material of old carved ivories would be now impossible, time having, in the generality of cases, completely changed their colour.

It is difficult to understand how the large slabs and other pieces used by the ancient ivory carvers were obtained; and it is a curious fact that the largest tusks now procured would not yield the blocks from which ivories were carved either in the Roman or middle ages. Either they possessed in those days a method of softening and flattening solid pieces, or the tusks of the present ivory are from smaller and degenerate animals. In the British Museum there is an old plaque 16¼ in. in length, 5½ in. in width, and ¼ in. in depth, presenting an area of ivory which no tusk of any modern animal could possibly produce in a natural manner. A fifteenth-century receipt in the just named museum states that by applying muriatic acid ivory becomes soft and ductile, and that if afterwards dipped in white vinegar it hardens again.

In tracing the early history of the art of carving ivories, we have before us examples which testify to an antiquity long before the Christian era. Specimens, for instance, of Egyptian work are now extant of dates earlier than Ahab or Solomon. In the British Museum can be seen two daggers, ornamented with ivory of, it is said, the time of Moses, or 1,800 years before Christ. In the same museum are visible fifty Assyrian ivories, found at Nineveh, which Dr. Birch ascribes to the seventh century B.C., whilst Layard considers them at least 200 years older than that period. When sent to England by Mr. Layard, they were in a state of decay, but the decomposition was arrested at the suggestion of Professor Owen, by boiling them in a solution of gelatine.

Greek sculptors did not think it beneath them to work in this substance. One of them, a traveller, Pausanias, has left an account of ivory statues which he saw in his journeyings, and has particularised one of Venus at Megæra by Praxiteles. Specimens of this period are, of course, extremely rare. The British Museum, however, possesses several samples undoubtedly of Greek artists, and no less than 70 pieces of Egyptian, Greek, and Early Roman (*i.e.* B.C.) are to be seen in Mayer's Museum, Liverpool. They are for the most part small and fragmentary, but some are of great beauty, although having suffered more or less from decay.

The Roman ivories after Christ are also extremely scarce, and these form, what Mr. Maskell calls, "the glory of the Mayer collection" in Liverpool. They are the celebrated Fijervary ivories of the third century, and as tablets have been described as of matchless excellence. The large importation of elephants under the Roman Empire for the purposes of the amphitheatre was one cause of the more extended use of ivory at that epoch.

After the Roman we enter the Byzantine period, which may be said to begin about A.D. 350, or a few years after the death of Constantine the Great, who was born in 274, and died in 337. Some centuries afterwards began the great persecution by the iconoclasts, say in 700, when multitudes of intelligent artists were driven over the whole face of Europe. The Roman pontiffs gladly received these fugitives, sheltered them, and gave them a monastery for their use. From the celebrated seminary *Scuola Greca* artists proceeded all over Europe, France, and Germany, and even England being visited by these refugees. In the tenth century the progress of Byzantine art was rapid, and in the eleventh century the highest perfection of this school was reached. Towards the end of the fifteenth century a change took place in the subjects selected and in the objects to which carving was applied. Devotional tablets became more or less frequent, and mythological subjects received more favour. In the sixteenth century, legends and romances which had been depicted on ivories were forsaken, and the prevailing taste, instead of assisting the cause of religion and morals, as in previous centuries, degenerated still further.

Within recent times the art has partially revived in Germany and France, the principal places of workmanship in the latter-named country being Paris and Dieppe.

Upon the question of nationality, Mr. Digby Wyatt says it is usually so marked by style that the judicious connoisseur will distinguish it almost by sympathy. To define, he says, precisely, why one specimen is believed to be French, another German, and a third English, would be no easy task, and yet the greatest authorities arrive almost invariably at a unanimity of judgment. France was by far the largest manufacturer. Mr. Wyatt says a peculiar *nez retroussé*, a dimpled, pouting, and yet smiling mouth, a general *gentillesse* of treatment, stamp French work with an almost unmistakable character.

To the French style may be assigned a position midway between French and Italian. There can be no question but that carvings in ivory were much sought after in England, and that there must have been numerous English artists. One feature in English carvings is that the mark of the cutting-tool is not rounded off or smoothed down by other implements. Hence, often every stroke of the chisel is exhibited. Maskell says that the old English Gothic ivories possess a purity and variety of treatment which are analogous to the beauty of the contemporary architecture in this country.

In Germany, the art has ever been extensively cultivated. This school is remarkable for its elaboration and finish, but rarely has risen to the type of great physical or intellectual beauty.

One great feature of the Italian style is the spiritual, partaking of the Greek immovability.

Respecting the dates of the different epochs, it will be of assistance to those interested to remember that the Byzantine ranges from 400 to 1100 A.D.; Gothic, 1200 to 1400; Cinquecento, 1450 to 1550; Renaissance, 1550 to 1600, Mr. Clark then proceeded to speak of the artists who had worked in ivory.

To those desirous of further investigating the subject, he said he would refer them to the ivory-carvings to be found in the British Museum; South Kensington Museum; Mayer Museum, Liverpool; Ashmolean, Oxford; and Bodleian Library, Oxford.

* From a paper on Ancient and Mediæval Ivories, by Mr. Henry Clark, of Bromborough, read at a meeting of the Chester Archæological, Architectural, and Historic Society, and reported more fully in the *Chester Chronicle*.

PARIS NOTES.

The Hôtels of the Orleans Family. — The division of property belonging to the house of Orleans has been a fortunate event to French architects. The princes have hitherto resided on the common property of the family, which could not be altered, or even improved, without the formal authorisation of the *conseil de famille*. At present, however, the different shares have been allotted, and the five millions indemnity accorded to the princes by the National Assembly will be spent in extending and improving the different hôtels and châteaux of the Comte de Paris, the Comte d'Eu, the Prince de Joinville, the Duc d'Aumale, &c. The castle and domain of Eu has fallen to the share of the Comte de Paris. The château d'Eu, a construction of the seventeenth century, has been disfigured by incongruous additions made to it during the First Empire and the reign of Louis Philippe. M. Viollet-le-Duc has been charged with the restoration of the building, and after one or two visits to Eu in company with the Comte de Paris, it was decided that the clumsy peristyle that disgraces the façade should be removed. The garden-terraces are also to be demolished, and vast kitchens constructed underground. There are few alterations to be made in the interior, and the Comte de Paris will be able to take possession of his residence in the month of June. A large hôtel will be constructed in Paris near the Trocadéro for the reception of several princes of the Orleans family. The foundations are already laid in an inclosure which was formerly occupied by a colony of *chiffonnières*; and the news that the Prince de Joinville and the Duc de Nemours are about to inhabit the neighbourhood has caused five new hôtels to be placed in the hands of contractors. M. Viollet-le-Duc considers the Trocadéro the finest site in Paris.

A New Commemorative Monument.—France is being gradually studded with architectural memorials of the last war. Had the campaign ended at Berlin, and resulted in the surrender of the Rhine borders, there could scarcely be a greater number of triumphal arches, statues, tombs, and chapels, than have been erected to commemorate defeat. The last monument projected is to be raised at Mars-la-Tour, in memory of the soldiers fallen at Gravelotte, St. Rivat, and Mars-la-Tour, from the 16th to the 18th of August, 1870. The committee formed to execute the project has accepted the work of M. Bogins. The monument measures nine mètres from the base. It is composed of a severe and simple pedestal, surmounted by a colossal group in bronze representing the figure of a soldier struck in the heat of combat, and falling into the outstretched arms of France, who holds a sword aloft. This last figure points to the frontier not many roods distant from the spot where the monument will be erected. Several monuments of this kind are to be placed in different public places of Paris. M. Bogins had offered his project to the municipality, but at a price which the city authorities judged excessive. The monument will be inaugurated on the 16th of August, the anniversary of the battle of Mars-la-Tour.

IMPROVEMENT IN ORGANS.

THE specification of a patent taken out by Mr. Thorneloe, of Birmingham, for some improvements in the arrangement and manufacture of organs, includes one novelty which is of some importance. Of late years our leading organ-players have been seeking for new combinations and effects by manipulating two key-boards at once, with the thumb and fingers of the same hand; and to do this it is, of course, essential that the keys of each "manual" should be brought as near each other as possible. This has hitherto been arrived at by bringing out the ends of each row of keys so as to overhang the row below; but this, of course, does not affect the vertical distance between the keys. Under the new patent, the several ranks of keys are brought so near each other, vertically, that there is scarcely half an inch between the black key

of one row and the white key of the row above; the usual intervening beading is dispensed with, and the necessary space for coupling actions and other mechanical contrivances between the key-ranks is obtained by the simple but ingenious method of radiating (vertically) the several key actions, from the front to the interior. The only drawback to the arrangement is, that the space saved from back to front of the key-boards by the overlapping system is lost, and the back row of keys consequently thrown further from the player; but this would not be seriously felt in organs with less than four manuals; and in other respects the advantage to the player in combining the key-boards, and in passing from one to another, will be very great indeed.

A contrivance for lessening the pressure of the wind against the "pallets" in opening them is very ingenious, and would contribute to render the action easier to the player, but at more cost than it would be worth probably; and in large organs it would not supersede the desirability of Mr. Willis's beautiful invention of the pneumatic lever. There are other points in the patent worth notice, but the disposition of the key-board constitutes its chief value.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

THIS Association, which now numbers 137 members, comprising most of the large cities and towns in England and Wales, continues to progress rapidly; the objects of the Association, as taken from Rule 2, being as follow:—

(*a.*) The promotion and interchange among its members of that species of knowledge and practice which falls within the department of an engineer and surveyor engaged in the discharge of the duties imposed by the Public Health, Local Government, and other Sanitary Acts.

(*b.*) The promotion of the professional interests of the members.

(*c.*) The general promotion of the objects of Sanitary Science.

The members of this Association being placed so widely apart, it must be obvious that, to continue its successful career, much must depend upon the formation of district committees, having for each district an energetic hon. sec. Three district centres have already been formed, viz.:—Midland, Lancashire and Cheshire, and Yorkshire; and one in course of formation for the Home Counties. Many important meetings have already been held respectively in Warwick, Leamington, Birmingham, Warrington, Manchester, Liverpool, and Leeds, at which important questions have been discussed on sanitary matters, affecting the comfort and health of the population of this country generally.

Mr. E. Pritchard, C.E., of Warwick, the hon. sec. for the Midland district (the first committee formed), has called by circular, the fourth meeting of the committee, to be held at the town-hall, Leicester, on the 14th of March, when it is proposed to visit the Leicester Sewerage and Waterworks; after which papers are to be read by Mr. Lewis Angell, C.E., the president of the Association; and by Mr. E. L. Stephens, C.E., the borough surveyor of Leicester.

The annual meeting of the Association will be held in Birmingham in May next.

TRIMDON PARISH CHURCH.

THE re-opening, after its enlargement and restoration, of the old parish church of Trimdon, in the county of Durham, took place on the 29th ult. The church dates from the year 1164, and consisted of a nave and chancel with western bell-cot and south porch, and had accommodation for about ninety persons. The porch has been taken down and rebuilt. A lean-to aisle has been added on the north side, and united to the nave by an arcade of thin pointed arches. In place of the flat ceiling and close roof of the old church, new roofs have been constructed with arched principals resting on stone corbels, and purlins and rafters and cross-braces. The old wooden windows of Batty Langley Gothic have been removed, and pointed windows of two-lights, with stone jambs and arches, have been inserted. The east window is of three lights, with moulded tracery. The priest's door has been refitted with strong jambs and arch. A vestry has been added on the north side. The whole of the rough cast has been picked off, and the walls neatly pointed and dressed. An open drain or area has been laid all round the building, to preserve the dryness of the interior. The floor has been laid with red and blue tiles, with one step at the chancel and another at the altar-rail. A simple stone slab pulpit occupies the south-east angle of the nave, and a lectern and prayer-desk are placed in the usual position.

Sittings are provided for 150 persons in open benches, with book-boards and kneeling-stools. All the woodwork is plain and varnished.

The contract was taken by Mr. Robt. Borrowdale, of Darlington. Messrs. Hay, of Liverpool, were the architects.

ARCHITECTURAL DODGERS IN CHICAGO.

WE find the following in the *Chicago Times* of February 15th, and let it speak for itself:—

"Mr. J. C. Rankin, the superintendent of construction of the monstrosity known as the United States Custom House at Chicago, is a very modest man, and will be shocked upon hearing of a matter that may place him in a false light by those who do not appreciate him. Mr. G. O. Garnsey, partner of Mr. Rankin in the architectural draughting business, is now travelling in Europe, and will share Mr. Rankin's grief upon learning that some cheeky and mendacious individual has deliberately and most recklessly misrepresented the firm and one of the firm's pictures.

The cause of the unutterable anguish that is about to come to the lot of Messrs. Rankin & Garnsey may be explained in a few words by a disinterested party like the *Sunday Times*. It may cost Messrs. Rankin & Garnsey a great many words to explain it to the perfect satisfaction of a credulous public. The *Builder* is a journal published in the city of London, England, and devoted to the interests of the architect, engineer, operative, and artist. It is said to be the most influential journal of its kind in Europe, and has a circulation in all parts of the world. In its issue of December 27th ultimo, the *Builder* published a full-page illustration entitled, 'Proposed City Hall and Public Buildings, Chicago, designed by Messrs. J. C. Rankin & G. O. Garnsey, architects." The picture bears a close resemblance to a plan offered to the city and county authorities some months ago, and which was repudiated by them almost at first sight. On the following page is a detailed description of the design, which is introduced in the following language:—

'Designs having been invited for the city hall and county buildings for Chicago, forty-nine sets of drawings were submitted, and from these eighteen were selected as the best. Of the latter, the design by Messrs. J. C. Rankin & G. O. Garnsey, architects, received the majority of votes.'

Who can picture the indignation of Messrs. Rankin & Garnsey (the latter is now in Europe) upon reading this mendacious misrepresentation. Rankin will swear round Scotch oaths at the assurance of the man who informed the *Builder* that his plan received a majority of votes when the first selection of eighteen was made, because Rankin knows that he got his plan in among the eighteen by the merest scratch, and it was never included in any subsequent selection. And how presumptuous in the unknown man to mislead the *Builder* at a time when Mr. Garnsey was in Europe, and would be certain to drop round to the publishing office the next morning, and expose the falsehood!

Inasmuch as there never was, at any time, the faintest suspicion that the design published in the *Builder* would be selected by the city and county authorities; and inasmuch as Messrs. Rankin & Garnsey had so little show in that memorable scramble, that they scarcely knew that they were ever in it; what inconceivable wickedness was shown by the party who sought to mortify them by representing, months after the three prizes had been awarded to other parties, that their picture was the favourite of a majority of the officials voting! Who is the man that has conspired to bring this deep chagrin upon two virtuous and intellectual picture-makers, one of whom was in Europe at the time? Was it Matz, or Gay, or Tilley? Did these three prize-winners conspire merely for the purpose of making Messrs. Rankin & Garnsey a laughing-stock? Here is woe spreading across the ocean into two hemispheres. Rankin in America, and Garnsey in England; so far apart, and yet suffering a common anguish. Who is the heartless man that has caused all this mischief, deceived the *Builder*, and made game of Messrs. Rankin & Garnsey?"

SOUTH LONDON MUSEUM.

THE new building for the South London Museum is shortly to be proceeded with, but in consequence of the project not having been taken up so warmly as was at first expected, it is not to be erected on the site originally proposed, nor on so large a scale as was in the first instance contemplated. It appears that Mr. Clements, with whom the idea originated, and who is possessed of a valuable collection of treasures, which he is ready to deposit whenever a suitable building is provided, has purchased a site in the New Kent-road, and intends himself to commence the erection of the building in the course of a few weeks. The situation is not so central as the one originally selected in Newington Butts, but it is still very accessible. The land which has been secured by Mr. Clements is not so large as the original plan would have required, and the building about to be erected will be about 130 ft. long. We are told that the plans for the building are now in course of preparation, and that, as at present arranged, it is intended to lay the foundation-stone in May next.

MELYN SCHOOLS.

A HANDSOME block of school buildings has just been completed near Neath, Glamorganshire, for the use of the work-people at the Melyn Tin-plate Works, at the sole expense of Messrs. Leach, Flower, & Co., the spirited proprietors of these works.

The works were constructed in 1863 for the manufacture of tin and terne plates, of which a total quantity of 100,000 boxes (say 6,000 tons) per annum are produced, employing from 500 to 600 work-people, and supporting a population of several thousands.

In connexion with the manufacture of tin-plates, Messrs. Leach, Flower, & Co. carry on the business of japanning or decorating by a process patented and introduced from France, of which they have the control for the United Kingdom.

These decorated tin-plates, which are produced in every variety of design and colour, are exported very largely to foreign countries, and are also used extensively for tea, match, and biscuit boxes, and other articles of domestic use.

The library and reading-room attached to the schools are for the *free* use of the people employed at the works, and under suitable regulations will be available for their club meetings, lectures, and other entertainments.

Our illustration shows the school buildings surrounding a quadrangle 46 ft. by 41 ft. The boys' schoolroom measures 65 ft. by 18 ft., with class-room, 17 ft. 6 in. by 15 ft. The girls' room, 33 ft. by 18 ft., with corresponding class-room; the infants' room, 50 ft. by 18 ft. These buildings surround three sides of the quadrangle, the fourth side is occupied by the reading-room and library, 46 ft. by 20 ft.

All the rooms are lined internally with a dado, 5 ft. high, of white enamelled bricks, with encaustic tile borders.

The walls are of solid local sandstone, and all the dressed work is of Combe Down oolite.

The windows are glazed with cathedral glass, in artistic patterns, by Messrs. Bailie. The bell-turret contains a bell by Warner.

Mr. Roderick, of Margam, has executed the works at an outlay of about 2,500*l.*, exclusive of boundaries and site, which are also given by Messrs. Leach, Flower, & Co.

The architect was Mr. Norton, of London, who has recently built the Church of St. David, Neath.

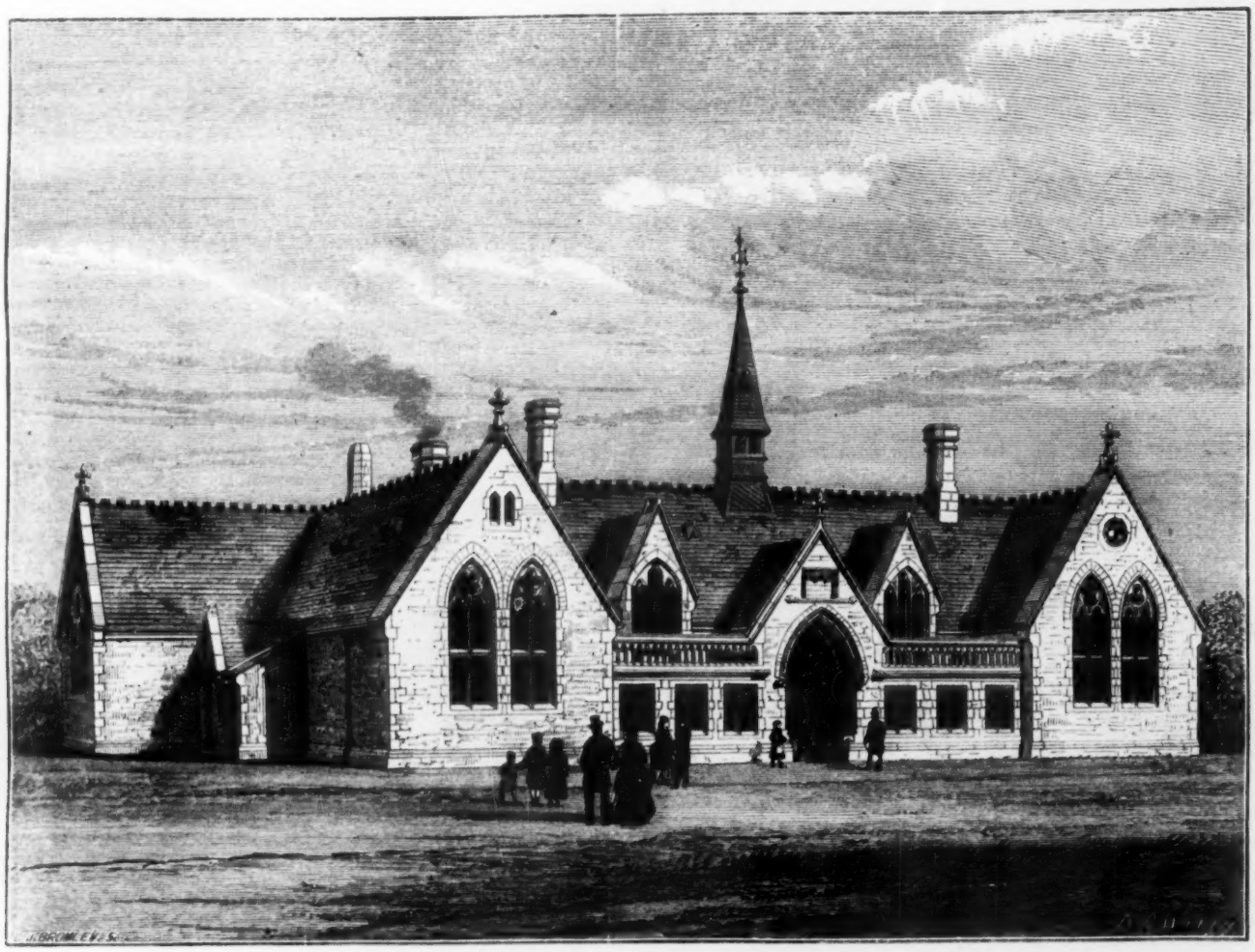
PORTAL OF THE DIGBY MORTUARY CHAPEL, SHERBORNE.

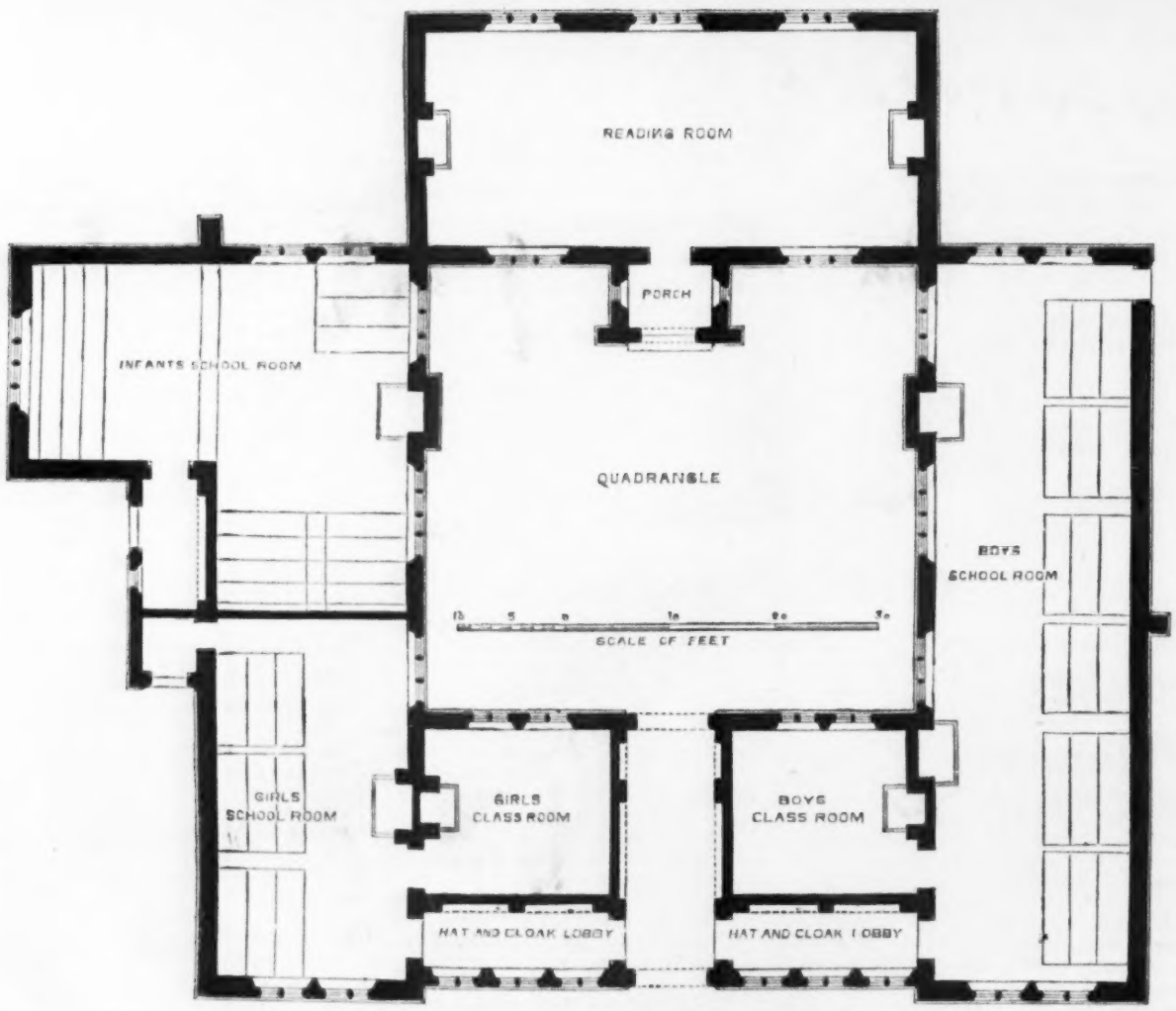
OUR engraving represents the Portal of the Mortuary Chapel of Mr. G. D. W. Digby, of Sherborne Castle, erected in the cemetery at Sherborne, Dorset. This portal is the design of the late Mr. W. Slater, executed by Messrs. Henry Poole & Sons, masons, of Westminster, in 1862, in which year the main part was erected in the Great International Exhibition, taking its place in class X, section C, and obtained medals for the architect and the artificers.

The ascent is a flight of seven steps in Kinton blue stone. The plain pedestal is of Chilmark, and the richly-moulded and carved jambs above of Steetley stone—the latter being a material of great durability and delicacy, and capable of developing the undercut carving in the moulding. Two of the arch ribs are variegated with voussoirs of red Mansfield and Cornish Polyphant stones. The pillars are of polished Sienna, Devon spar, Connemara green, and Pyrenean jasper marbles. The gate is of bronze.

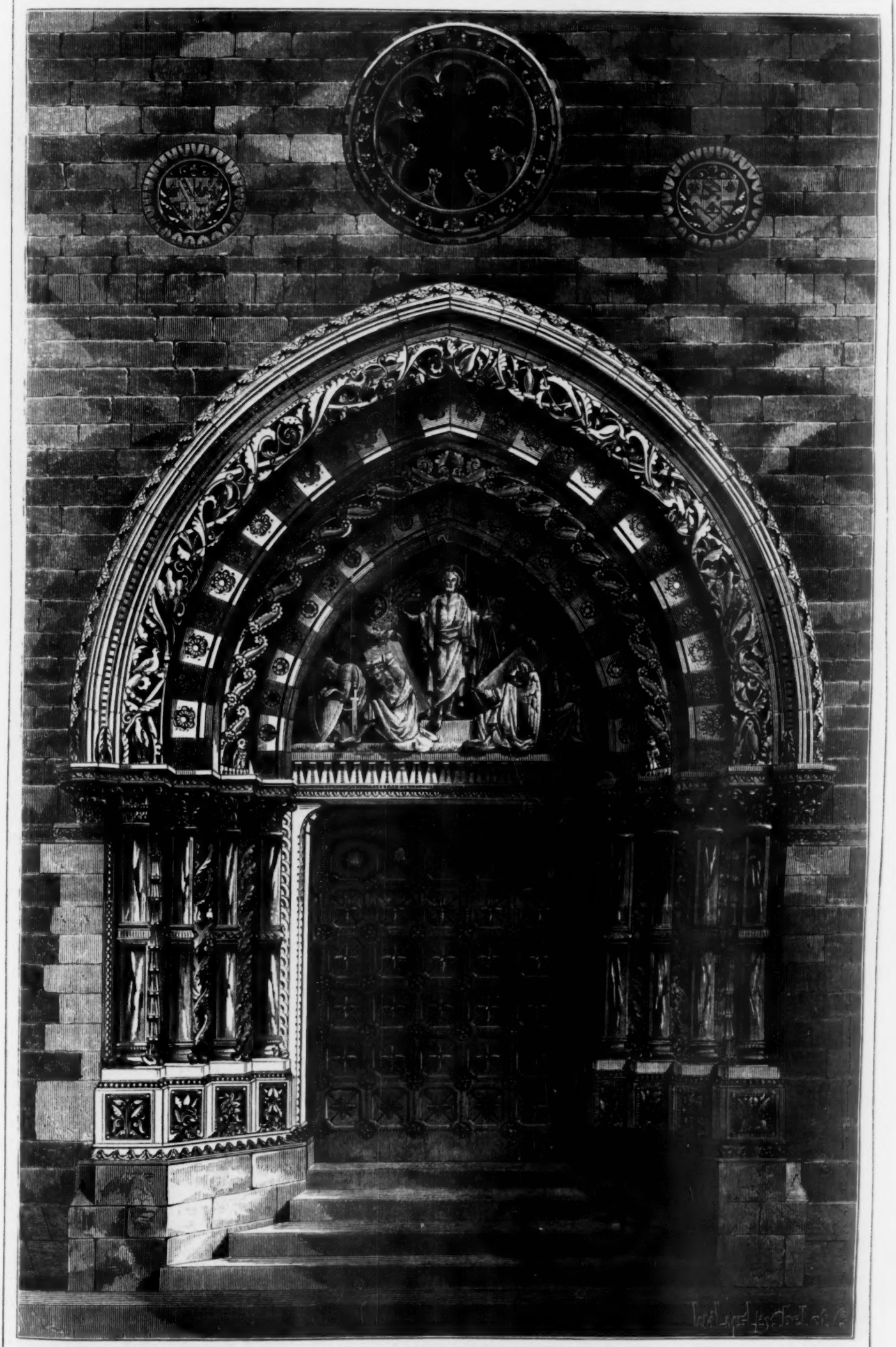
The sculptured tympanum was modelled, and afterwards executed in Huddlestone stone, by Mr. J. Redfern, of London.

Græco-Buddhistic Sculpture. — At the Society for the Encouragement of the Fine Arts, last week, Dr. Leitner delivered a lecture on his "Discoveries of Græco-Buddhistic Sculptures at Takht-i-bahai in Yusufzai, on the Punjab Frontier." Mr. James Fergusson, F.R.S., occupied the chair. The lecture was listened to throughout with great interest by a numerous and distinguished audience, many of whom, for the first time, found themselves in a position to compare, from specimens exhibited by the lecturer, the Greek with the Buddhist art, forming the, until now, missing link in art-history. The usual votes of thanks to the lecturer and chairman terminated the proceedings.





MELYN SCHOOLS, NEAR NEATH, GLAMORGANSHIRE.—MR. JOHN NORTON, ARCHITECT.



PORTAL OF THE DIGBY MORTUARY CHAPEL, SHERBORNE CEMETERY.——DESIGNED BY THE LATE MR. W. SLATER.

ON BELLS, AND MODERN IMPROVEMENTS FOR CHIMING AND CARILLONS.*

THE machinery used in Ghent is on the same principle as all the other towns, and the same as has been used in England till within the last few years. A large barrel of either iron or brass, with pins in it of large size to catch upon the ends of the levers, to which are attached the hammers which strike the bells, to raise them, and let them fall again immediately on the bell, is driven by a smaller drum or wheel, round which is wound the flax or iron wire rope, to which is attached the weight, which is the motive power. At Ghent, the music drum is made of brass with square holes punched into it, and into which holes iron lifting-pins are placed. The surface of the barrel being divided by the square holes into intervals for crotchets, quavers, and semi-quavers, it is a matter of no very great difficulty to arrange the tunes, and when it is desired to remove them for a change of tune it is easy to knock them out from the inside, and to put them in such other holes as the nature of the notes to be produced may require. The ropes here are of flax; the driving weight is 300 lb., and is wound up twice a-day. There are as many as four hammers to some of the bells, and none have less than three. The brass drum is about 6 ft. in diameter, and when in motion reminds one very much of a water-wheel, so ponderous does all the machinery look. It was constructed by Charles Nolet, a native of the town, and I have no doubt his fellow townsmen are very proud of his memory, for he must have been long since dead. The next place, *en route*, is Bruges, where the machinery is on a much larger scale than even at Ghent, the barrel being 8 ft. in diameter, forty-eight bells, and as many as six hammers to some of the bells,—190 in all. The machinery was constructed by Antomusde de Hondt, of Bruges, as far back as 1748, and of late years iron wire has been substituted for flax. The weight has to be wound up every two hours, a man living in the tower for that purpose. The clock here is worthy of passing notice, being of a very large size to carry the hands for the dials, which are 19 ft. in diameter. It has a gridiron pendulum, which is supposed to compensate for changes of temperature, but which it certainly does not do to any satisfactory extent. It strikes the hours at the hour and half-hour,—on a different bell at the half-hour to distinguish them, and a tune is played at each quarter. As at Ghent, there are small clappers fixed inside the bells, by which they are played upon by hand. The performance is done in this way. The man who is about to distinguish himself regularly prepares as for a pugilistic encounter. He takes off his coat, waistcoat, and hat; puts his long hair learnedly off his forehead and behind his ears,—at least, the man I saw did;—looks intently for a few moments into the corner of the room; puts on a regular pair of boxing-gloves in the greatest possible hurry, evidently for fear that the brilliant melody should escape him; sets himself down in front of long rows of pegs and pedals, and bangs away at them as hard as ever he can go, first up, then down, now in the middle, now both ends at once, and I believe the whole lot would have gone down at once if he could have managed it,—legs and arms all going in a perfect frenzy; but there being many more pegs than arms and legs, he could not manage more than a certain number at a time. How thankful the Antwerpers ought to be. Now for the result produced—a great deal of clatter and fatigue, but very little music. Noise and jingle, most lovely to those who like it; but I am one of those unappreciative sort of people who do not think that music consists in a thundering noise and clatter. Dr. Gatty, in his "History of the Bell," says, upon this subject:—"The Carillonneur uses both hands and feet in executing the sprightly airs which charm the inhabitants of the cities of the Low Countries. The pedals communicate with the larger bells for the base; and the keys upon which the treble notes depend are struck by the hand edgeways, the little finger of the player being defended by a thick leathern stall. It requires considerable strength, as well as celerity and skill in the player, for unless a violent blow be given to the key, only a weak sound would be produced"; and Dr. Burney (in "Present State of Music in Germany, 1772") says—"The want of something to stop the vibration of each bell at the pleasure of the player, like the valves of an organ, is an intolerable defect to a cultivated ear, for by the notes of one passage perpetually running into another, everything is so inarticulate and confused, as to occasion a very disagreeable jargon." He also says:—"The carillons are said to be originally of Alost, in this country (that is, Germany), and are still here and in Holland in their greatest perfection."

The next town I visited where there are chimes was Antwerp, where there are forty-eight bells. The bells are swung as well as chimed on by the machinery, which was made by Von Hoof, in 1786. The weight is wound up twice a day. These people seem very fond of winding up weights. Nothing less than twice a day suits them,—and in one instance named, every two hours. The next, and last, in my route, was Namur, where there are fifty-four bells. The machinery was made by Nolet, of Ghent. Of the date I have no note; but, I should say, decidedly more recent than the machine by the same maker at his native town, the whole arrangement of the bells and hammers and machinery being much more perfect and mechanical. The music was taken in excellent time. There was a distinct melody running all through, with a most judiciously-arranged accompaniment in the base.

There has been a large bell-foundry, where, I believe, nearly, if not all, the Belgian bells have been cast. Van Acholt is the proprietor. At the time I visited him he had nothing particular in hand; but, a few years ago he sent a large peal of forty-two bells to this country, for Boston, in Lincolnshire, which are considered to be very good. The process of manufacture of English bells, which I am now about to describe, will apply equally to the German bells; and I need only mention here, that many people consider them superior in tone to ours. I believe that a great deal of this apparent superiority is due to the number they use. Take them singly, and, undoubtedly, they are thin in quality of tone.

I have now reached the second part of my paper.

Church-bells: their Manufacture and Uses.—There is a most excellent work about bells, edited by the Rev. H. T. Ellacombe, and called the "Bells of the Church," a supplement to the "Church Bells of Devon," and I was so much struck with the easily-understood description he gives there of bell-founding, that I think I cannot do better than give it in his own words, illustrating it by similar diagrams as are to be found in his book, more especially as he there describes a bell-foundry from which my firm are constantly receiving bells of which we have a very high opinion. He says:—"It will be interesting to the general reader if I describe the modern process of bell-casting. This I am the better enabled to do by taking the establishment in Whitechapel, the oldest in London or in England." Before describing the process of casting a bell, it may be well to state that bell-metal consists of an amalgam of copper and tin, in proportion of about three parts of copper to one of tin. There are, of course, various trade secrets as to the exact proportions of the different metals necessary to constitute a first-rate alloy. Mr. Denison in his book says, that "after many experiments he has come to the conclusion that the proper composition for bells is thirteen of copper to four of tin."

There is no great mystery after all in the bell-founder's art, but extreme care is necessary, in order to produce a good toned bell, that all the preliminary operations should be conducted with the greatest exactness. Passing through various yards at the Whitechapel foundry—in which are stored quantities of old timber, old bell-metal, and a multitude of odds and ends, in the shape of cannon and great masses of old copper destined one day for the furnace—we arrive at the mould-ing-room. In describing the casting of a bell it will be necessary to observe that it is nothing more than a layer of metal which has been run into the space between the mould and its outer covering and allowed to cool. The various parts of a bell may be described as the body, or barrel; the clapper, or striker, hanging on the inside; and the ear, or cannon, on its top or crown, by which it is hung in its chosen position in the tower.

The following description applies to all bells, large and small, the various modifications in the shape, &c., not interfering with the principle on which it is manufactured. The first principle to be observed, is the construction of the shape or form of the future bell, so as to ensure that due harmony in all the parts which shall give to it the proper degree of tone and vibration. Various theories have obtained in different countries, and among the different founders of our own country, as to the best proportions for bells; but the following scale has been proposed and generally followed at this foundry as coming nearest to perfection. Taking the thickness of the sound-bow or brim—that is, the part where the clapper strikes,—a bell should measure in diameter at the mouth, fifteen brims; in height to the shoulder, twelve brims; and in width at the shoulder, seven and a half brims, or half the width of the mouth. These proportions, however, are very variable, and depend greatly on the taste, experience, and skill of the founder, an approximation merely being arrived at in these figures. Mr. Denison says, "The most essential point of all to be attended to in ordering bells is to require absolutely, and in spite of all protestation of the founders, that none of them when finished are to be thinner in the sound-bow, or thickest part, than one-thirteenth of the diameter." I know that some good old bells are a little thinner, but I never saw a new one that was less, and had at the same time anything of the soft and sweet tone which church-bells ought to have. I can only account for the old ones bearing to be thinner, though by no means so thin as many modern ones, by the well-known greater softness and toughness of the copper of old times, when they smelted less metal out of the ore. The small bells of a peal are always rightly made thicker in proportion than the large ones, and will run up one-eleventh of the diameter, the large ones being one-thirteenth. I would here observe that Mr. Denison goes most minutely into the why and the wherefore of the proportions of metal and the shape of bells; and I have selected Mr. Ellacombe's description of bell-founding, because I have thought it would be more generally understood. To the searcher after information both books are invaluable, one treating exhaustively on the constructive part, and only slightly on what I may call the archæological part of the question; and the other exhaustively on the archæological, and only slightly on the constructive. I believe that Mr. Denison is at issue with some of the bell-founders about the proportions and shapes; but that his theory is a right one seems entirely borne out by the fact that many most excellent peals of bells have been constructed under his instructions, and that he is consulted in almost every matter of importance. The size and proportions, then, of the future bells being ascertained, the making of the mould is proceeded with. The outer form of the core, by which the inner shape of the bell is determined, is made by means of a crook, which is made to revolve on the clay, &c., of which the mould is composed. This crook is a kind of double compass, the outer leg of which is in two parts, formed of wood and metal. The inner part (of metal) is cut or curved to the shape of the outside of the core, or inside of the intended bell; and the outer part (of wood) to the form the ouside of the bell is to be made. This crook and compass is made to move on a pivot affixed to a beam above, and its lower end driven into the ground. In case of very large bells the mould is perfected in the pit in which they are to be cast. The crook is driven by the hand of the moulder, and the moulds being composed of plastic clay, &c., the form of the inner side of the bell is defined by a few revolutions of this simple machine. Thus is formed the core, or inner mould. The cope, or outer mould, is formed in much the same way, except that its inner surface is smoothed to form the outer side of the bell. The core is first roughly built up of brick-work, with a hollow in the centre. It is then plastered over with soft clay, &c., and moulded as described, by the action of the crook, and is afterwards dried by means of a fire in the hollow mentioned. When baked sufficiently hard, it is covered all over with a size of tan and grease. Over this size a coating of hay-bands and loam is laid, the exact thickness the bell is intended to be made: on this thickness the outer leg of the crook—the inner leg which formed the core having been removed,—is made to rotate, and so forms the shape of the inside of the cope or outer mould. This thickening being thoroughly dried, upon it is formed the cope, or outer mould, upon the outer surface of which are formed ledges, by means of which, when dry, it is raised, and the thickening destroyed. Both are then retouched, any device or inscription being impressed upon

* From a paper by Mr. George Lund read at the Society of Arts on Wednesday last.

the inside of the cope; it is re-lowered, and the hollow space between the cope and core is, of course, the exact shape the bell is to be. The head and staple to hold the clapper being now fitted above all, the mould may be said to be complete. A sufficient number of moulds being now formed for the number of bells to be cast, the pit is filled in with earth, firmly rammed down, to prevent the copes rising when the metal is run in. The furnaces are now lighted, the metals in their proper proportion are melted —sometimes as much as twenty tons at a time, —and from time to time tested, till found to be of the right temperature, when the furnace-doors are opened, and the molten metal directed through properly constructed channels to each mould in succession, till the whole number of bells is cast. Sufficient time is allowed for cooling. The earth is dug away from around the moulds, which are then destroyed, the bells being taken to the tuning-room, where they are tried for note; and when tuning is necessary, which is almost always the case, the bell is securely fixed into a wooden frame by means of wedges, underneath a steam cutter, which is then made to descend; the gearing of the engine is then turned on, and the cutter revolving cuts as much as may be required, either from the inside of the bell in the region of the sound-bow to deepen the note, or from the edge of the lip to sharpen it. There are, of course, other well-known bell-founders besides Messrs. Mears & Stainbank,—namely, Messrs. Warner & Co., of London, and Messrs. Taylor & Co., of Loughborough. The latter firm have, within the last few years, cast some of the largest peals of bells in England, and, consequently, in the world, and which are pronounced by Mr. Denison, and the Rev. R. Cattley, who likewise has given great attention to this subject, to be amongst the finest ever cast. They are at Worcester, Rochdale Town-hall, and Bradford; unfortunately, at the last-named place, they are in much too confined a space, and are not heard to their best advantage.

The earliest notice of a belfry and a peal of bells is contained in the following passage:—Egelric, Abbot of Croyland (who died 984), in the time of Edgar, caused a peal of bells to be made for his abbey, to each of which he gave names, which it is needless to give here; and the celebrated "Benedictional of St. Ethelwold," in the library of the Duke of Devonshire, furnishes us with an earlier instance of a belfry with four bells, viz., about the year 980. From that time to the present, bells of all sizes, shapes, and weights have been cast, and I think that a few moments may not be unpleasantly spent in enumerating some of the most famous. The largest bell in England is, as you are doubtless aware, "Big Ben," the clock-bell at Westminster. It may not be equally well known that it derives its name from the fact that Sir Benjamin Hall, being head of the Metropolitan Board of Works when the bell was first cast, and his name inscribed on it, it was named after him, "Ben," and from its size was naturally called big; hence the name, "Big Ben." It bears this inscription:—"This bell, weighing 13 tons, 10 cwt., 3 qrs., 15 lb., was cast by George Mears, of Whitechapel, for the clock of the Houses of Parliament, under the direction of Edward Beckett-Denison, esq., Q.C., in the 21st year of the reign of Queen Victoria, and in the year of our Lord, 1858." It was contracted for that the bell should bear the blow of an 8 cwt. hammer, but after the clock had struck on it for a few months cracks showed themselves, and upon examination it was found that the metal was porous and the casting defective. The striking was then removed to the fourth quarter-bell, upon which the hours were struck for two or three years; but, after many complaints of the confusion, the striking on the big bell was resumed (November, 1863) with a lighter hammer, the bell being turned a quarter round by the button or mushroom head by which it is hung. The four quarter-bells were cast by Messrs. Warner without any known defect, and are remarkably good. I may here give you some information which may be new to you, and at the same time bear testimony to the remarkable time-keeping of the clock. We receive from the Royal Observatory at Greenwich by electric current a time signal every hour,—and I show upon the table the instrument we use for registering it,—having found it extremely inconvenient to be on the look-out exactly at the hour, failing which the signal was lost. It is the invention of a brother of mine, improved by myself only to this extent, that instead of using an ink-chronograph watch we use a stop-chronograph; and for the information of those who do not know the difference between the two, I would say that in one the seconds-hand is double, and that when the signal comes it draws the upper-hand through the reservoir of ink in the end of the lower-hand, and so marks the error of the watch on its dial or face, and that the hand is constantly moving. In our chronograph the hand can be started from zero and allowed to travel as long as desired, can be stopped, and again be brought to zero for another start, each being done by pressure. Having placed the hand at rest we put the watch into the instrument and leave it. At the next hour the signal is sent from the Royal Observatory, and the hand of the watch is started absolutely to Greenwich mean time. We can then at our leisure compare our regulators. The wire through which our signals come is used by the Westminster clock once each day, to transmit a register of its time to the Astronomer Royal at Greenwich, and to Mr. Dent, in the Strand. When we want to compare "Big Ben," we only replace our watch, and let the clock signal (being the second pressure) stop the hand. Whenever it stops to the right or left of zero, so is it fast or slow time. If it stops at zero, it is, of course, correct time. It is very rarely, indeed, that we find it many seconds out. The next largest bell in England is "Peter of York," diameter, 8 ft. 4 in.; height, 7 ft. 7 in.; weight, 12 tons 10 cwt. The note is F sharp. The next great bell is the "Mighty Tom" of Oxford, 7 ft. 12 in. in diameter, and weighing 7 tons 12 cwt. The note is generally considered to be A, but being faulty in some parts the tones vary, and some say it gives out five notes. Rather a cheap way that of getting the effect of a peal of five bells. Three unsuccessful attempts were made to cast it in 1681; twice it wanted metal enough to make out the canons, and the third time it burst the mould and ran into the ground. It was at last, can I say successfully cast, with its five notes, by a London bell-founder, named Christopher Hodson. In 1682 it was moved from the church to the Gate House, and on the 29th of May, 1684, it first rang out between eight and nine at night, from which time to this a servant tolls it every night at nine, as a signal to all scholars to repair to their respective colleges and halls.

There is a great bell at Lincoln Cathedral weighing 5 tons 8 cwt.; note A. This, and the two quarter-bells, were cast from the old 1610 bell, and six other bells from the rood tower, called the Lady bells, by Mears, of London, in 1834. St. Paul's has a large hour and two smaller quarter bells, none of them anything to boast of, in the south tower. There is, however, in the north tower, a bell which bears the inscription:—"Made by Philip Wightman, 1700." The diameter is only 49½ in., and the thickness 3¼ in., yet the tone is most deep and sonorous, and I think, for its size, one of the most pleasing to the ear I ever heard. Having had occasion to try it several times, the impression remaining of it is a most pleasing one, which I cannot say of the three other bells; the quarter-bells are specially poor and lacking in quality of tone. There are also large bells at Leeds Town-hall, St. Dunstan's, Canterbury, and at Glasgow. One of the latest additions to the large bells in England is at Worcester Cathedral for the new clock to strike on, and for occasional tolling. It is hung on the balance-beam principle. The gudgeons or pivots on which the bell moves are wedge-shaped, and roll on hand brasses very slightly hollowed; the friction is thereby so little that the bell can be tolled by one man with one hand, although it weighs 4½ tons, a lever being attached to the stock instead of a wheel, which is necessary under some circumstances. It was so tolled for service for the first time by Mr. Denison and the Rev. H. T. Ellacombe, on Sunday, the 17th January, 1869, in the company of the Rev. R. Cattley and others, and it is owing to the last-named gentleman's indefatigible efforts that the peal has since been made up to thirteen bells, and machinery provided to play tunes upon them.

I may here be permitted to publicly thank him for his extreme courtesy to me on the occasion of a visit which I lately made to Worcester, amongst other towns, to hear chimes about which much has been lately said in the public press. In this case, at least, the eulogy appears to me not to have been misdirected. Anything more perfect in the way of general arrangement of bell-framing to support and carry the bells, of fittings in the bell-ringers' floor, and evidence of heart and soul enthusiasm of the master-mind in the work from floor to roof of the tower, is not to be found. This is no fulsome flattery, but a statement of plain truth, as any person going there can see for himself. The bells, made by Messrs. Taylor, of Loughborough, are undoubtedly very fine, and the clock, made by Messrs. Joyce, of Whitchurch, is a specimen of English work of the highest order; and here my criticism ends. Others are as well able to judge of the effects produced as I, and I prefer to say nothing about them.

THE EAST LONDON RAILWAY WORKS UNDER THE LONDON DOCKS.

A FEW days ago we paid a visit to the important engineering works now in progress at Wapping for carrying the East London Railway, in the course of its extension to Liverpool-street, under the London Docks. The works, which are of unusual magnitude, considering that they involve in the result no more than the construction of half a mile in length of railway, commence at the present Wapping station of the company, and after passing under the London Docks in a northerly direction, terminate at an underground level in Shadwell, almost immediately under the station of the London and Blackwall Company. This point is the termination of the contract now in course of execution, but the line is to be carried forward from Shadwell in a north-westerly direction, passing under Whitechapel and Bishopsgate-street, and thence forming a junction with the recently-opened extension line of the Great Eastern Company, and having its final City terminus at the north side of that company's new station in Liverpool-street, now in course of erection. The contract for this last-named portion of the line is to be commenced immediately, and, as compared with the heavy undertaking now in progress at the London Docks, the works are light; it is expected that they will be completed and ready for opening simultaneously with the finishing of the Wapping and Dock contract.

These last-named works, which we have now more particularly to describe, have been designed by Sir John Hawkshaw, the company's engineer, and are being executed by Messrs. T. A. & C. Walker, of Victoria-chambers, Westminster, and when it is stated that before completion they will involve an outlay of 500,000*l*., their great extent and magnitude will be at once perceived. They have been in progress for a little more than two years, being divided into three sections, all of which have been simultaneously going forward, and certain portions are now nearly completed. One of these is the section commencing at the junction with the present Wapping Station, and extending to the entrance to the docks, which is now almost in readiness for being connected with the latter when the works there are finished. The Wapping Station, as is generally known, leads to that portion of the line under the Thames which was formerly known as the Thames Tunnel, but which now forms a part of the East London Railway, in the direction of New-cross. The length of the extension line between the Wapping Station and the entrance under the docks is about 380 yards, and in order to arrive at the present railway low-level at the Wapping Terminus, it has been necessary to excavate to a depth of upwards of 60 ft. below the ground or street level. During the progress of these works pumping operations were rendered necessary, in consequence of the immense quantity of water which impeded the work, and pumping-engines were constantly at work day and night from the commencement to the completion of the works, and thus the difficulties, formidable as they were found to be, were eventually overcome. The excavations have now been completed, and the intended railway level reached, and a portion of the area, to the extent of about 50 yards in length northwards, will be made use of for extending and enlarging the present Wapping Station, which will be covered over with a glass roof. The remaining portion of the newly-formed line, to its entrance under the docks, is to be arched over.

That portion of the works which is intended to carry the line under the London docks must next be noticed. It is undoubtedly the heaviest portion of the entire undertaking, presenting engineering features of a character no less formidable than difficult. When the works were first projected Sir John Hawkshaw's intention was to carry the railway under the bed of the

docks by tunnelling, but subsequently deeming the process hazardous in consequence of the possible breaking in of the water during the progress of the works, it was determined not to proceed upon this principle, but to construct the works in two sections, by a system of coffer-dams. The line passes under the east side of the docks, and by the plan pursued in the construction of the works, the shipping in the docks is interfered with to the smallest possible extent. The first process was to construct a coffer-dam at the south-east angle of the dock, in order to admit of the water being run off, preparatory to the excavations being made through the bed of the dock. This coffer-dam extends about half way across the dock, and during the progress of its construction many obstacles have presented themselves, and the exercise of great engineering skill has been necessary. The difficulties which have been met with have had the effect of extending its completion over a much longer period than was expected, and it is only within the last few weeks that the brick-work in connexion with the construction of the tunnel has been commenced. The process by which the coffer-dam was constructed serves to give some idea of the magnitude of the work. In the first instance a double row of enormous piles were driven down into the bed below the dock, in order to enclose the area of the coffer-dam. The space between the outer and inner rows of these piles is 4 ft. in width, the whole of which was filled up with puddling from the bed of the dock to the upper surface of the enclosure, considerably above the average water level in the dock. The face of these piles within the coffer-dam was strongly boarded from the bottom of the dock to the top of the coffer-dam, before the puddling commenced, and this may be described as one of the most interesting features in the works. The piles having been driven down and firmly fixed, divers descended with the requisite materials, and constructed the wooden walls of the coffer-dam. This having been completed around the face of the coffer-dam, this part of the dock was then run dry, after which, the excavations from the bed of the dock to the level of the intended railway were commenced, and having been completed, the building of the tunnel is now in progress under the bed of the dock, by the railway being arched over, the crown of the tunnel being 5 ft. below the bed of the dock. When the brick-work is completed, its upper face will be covered with concrete and asphalte, and afterwards puddled up to the level of the bed of the dock. The water will then be again admitted within the coffer-dam into the dock, after which the same process will be repeated at the north-east side of the dock, thus completing the tunnel and the railway under the dock on the north side, in the direction of Shadwell. The works here are being vigorously carried forward, and in order to show the activity which prevails at this particular part of the undertaking, it may be stated that there are now no less than a thousand men employed, and sixteen engines at work within the docks.

Emerging from the docks, the line is carried forward northwards, in the direction of Shadwell, by a tunnel 70 yards in length, which has just been completed. This tunnel leads into an intended low-level station at Shadwell, bounded on the south side by Cable-street, and on the north side by the Shadwell Station of the London and Blackwall Railway. The area of the station itself, which will be considerably below the street-level, in an excavation which has already been completed, will be covered over with a glass roof; whilst the station buildings will be erected on walls and iron girders, thrown across the line on a level with the street above. This station was originally intended to be 350 ft. in length; but it has now been decided to make it a more important one than was at first contemplated, in consequence of the great traffic expected. The representations which have been made by the Brighton Company, with whose line the East London is to be directly connected at New-cross, as well as that of the South-Eastern Company, have induced the directors to decide that the station at Shadwell shall be 400 ft. in length, instead of 350 ft., as originally fixed, in anticipation of the expected general traffic at the East End to and from that station, and of the excursion-trains during the summer and holiday season.

The entire cost of the new works for extending the line from Wapping to Liverpool-street on the North, and for connecting the line with the London and Brighton and South-Eastern lines at New-cross, is estimated at 1,650,000*l.*

THE LAMBETH VESTRY AND THE CONTRACT SYSTEM.

AT the meeting of the Lambeth Vestry last week, a discussion took place on a recommendation of the Works Committee, that the vestry should for twelve months execute their own paving in all the thoroughfares in the parish. The chairman of the committee remarked that if the vestry affirmed the resolution, he felt confident they would become their own paviors in perpetuity. Mr. Mills, in seconding the resolution, advised that they should purchase the stone in bulk, and then select what stone was suitable for every particular road in the parish. Several members supported the proposal, one member observing that he thought it was the best way to keep down the rates. Mr. Turner, on the other hand, said the contract system was one of the best, and one of their bye-laws stated that all work above 50*l.* should be contracted for. If the vestry did the work they would but create extra expenses. Mr. Storr, in supporting the proposal, contended that the parish would get the benefit of purchasing large quantities of stone; whilst Mr. Sharpley did not see how the rates could be saved by the parish doing their own work; and Mr. Barker observed that if the motion was carried, they would find such a combination at the end of the twelve months, as to prevent them purchasing stone in large quantities. Mr. Macintosh, the surveyor to the vestry, being asked to give his opinion, said the contractors no doubt had their advocates in the vestry, and he did not stand there as their defender. The question before them was that of abandoning the present contract system, and doing the work themselves. He admitted that he had a predilection to lean to the present system, because men who laid themselves out for special business had special means for carrying such business out. They knew the ins and outs of such matters, and had resources at their command; whereas any public body must depend upon their agents, and they might be badly selected. But if they could not get their business done well under the contract system, he would say then let them become their own contractors. The proposal that they should do the paving themselves, was ultimately carried, leaving out "for twelve months." The new arrangement is to take effect from the 25th instant.

THE METROPOLITAN BOARD OF WORKS AND DISTRICT SURVEYORS.

AT the meeting of the Board last week, Mr. F. Fowler called the attention of the Board to the fact that certain officers of the Board had written letters to the public journals respecting the Pantechnicon fire. Certain of these letters he had noticed in the public prints signed by some of the officials in their official capacity, expressing opinions with respect to the late fire at the Pantechnicon, and upon subjects which were under investigation and discussion in the Buildings Act Committee. He thought this was exceedingly undesirable, and hoped that some stop would be put upon it. He concluded by moving that the matter be referred to the Building Act Committee, which was seconded.

Mr. Saunders thought that the officers ought to be quite at liberty to enlighten public opinion upon any point with which they were conversant, but still he considered it most undesirable for them to communicate with the public prints in their official capacity. The opinion of those officers might be mistaken by the public for the opinion of the Board itself.

Sir William Codrington thought that it was very wrong for officials to communicate to the public opinions on the subjects that were under discussion in the Building Act Committee.

Mr. Lloyd said that as the subject was under discussion in the committee referred to, it would be injudicious and wrong for a member of the Board to express himself publicly, but how much worse was it when a mere official of the Board did so?

After some further discussion, the matter was referred to the Buildings Act Committee.

Architects' Benevolent Society. — The annual meeting of this Society will be held at No. 9, Conduit-street, on Wednesday, the 11th instant. This association ought to be more widely supported even than it is.

JACKFIELD ENCAUSTIC TILE WORKS.

THE clays of Shropshire were turned to account by the Romans, and the relics dug up at Uriconium, near the foot of the Wrekin, of tesselated tiles made from red clay, were in all probability made from clays similar to those now worked at Jackfield. From a period so early as 1453 it would seem that the valley of the Severn was famous for ornamental tiles, for many specimens of that date have been found in cathedrals and churches.

Jacquemart, in his "History of Ceramic Art," says that Jackfield is the most ancient site of pottery in Shropshire, and that there exists a specimen of its brown pottery dated 1634. It is also said that names of persons from Jackfield are entered in the parish registers of Stoke-upon-Trent (who are supposed to have been potters) as early as 1560, and the site of that old pottery was on the ground which is now occupied by the Jackfield Encaustic Tile Works. The clays of Jackfield are specially adapted for geometrical and encaustic tiles, and the red clay under the present works is particularly fine. Encaustic tiles have been made in Jackfield for a number of years, but since the old works came into the possession of the present firm of Craven, Dunnill, & Co., great changes have taken place. The firm took a lease of about four acres of ground, and adjoining the old works built a large manufactory, which has now been in operation for nearly two years. They have since taken down all the buildings of the old works, and erected on their site, and joining up to their new works, large new warehouses, show-room, offices, and entrance-lodge.

The buildings consist of four blocks, one detached and the others connected, each block accommodating a separate branch of the manufacture. In the detached block the raw materials are reduced to a state ready for the hands of the workmen. This building comprises the boiler-house, engine-house, pan-rooms, blunging-rooms, slip-kilns, and dust-mills, together with the stores for the various coloured clays as they leave the slip-kilns ready for grinding. The second block accommodates the workpeople in the raw material, and the stores for the various clays and dust are prepared for their use, and contains the damping-places, where the clays are kept in a certain degree of moisture; pressers' shops, for the various colours of geometrical tiles; and the encaustic tile-makers' shops, with their stoves. The next block provides for the drying and firing of the goods, and decorating-shops, and comprises the "drying-house," where tiles made from dust are partially dried; the "seggar" house, where goods are prepared for and received out of the kilns; and the kilns where the goods are fired or baked, and also the glazing and enamelling kilns. On the first floor are workshops employed for painting, enamelling, or decorative purposes. The fourth block provides for the sorting and stocking of goods, and for packing them for despatch, also the offices and show-room. It contains the sorting-house, best and seconds warehouses, show-room, offices for principals and clerks, packing-house, straw-store, lodge, staircase, main entrance, lodge-keeper's dwelling, &c. This part of the building is fitted with water-closets and lavatories, and there are separate earth-closets provided for male and female work-people. Near to the detached block first described a small gas-factory has been erected, which supplies the whole of the buildings. The encaustic-makers' stoves, the drying-house, warehouses, and offices are heated by steam-pipes from the engine-boiler.

All the work-rooms are large and lofty. The encaustic tile-makers' room is 87 ft. long by 25 ft. wide, and the upper room of the warehouse block is 83 ft. long by 36 ft. wide, the roof being supported by polished principals.

In the exterior design extravagance of detail has been avoided, as not appropriate to the purposes of the building, but by a judicious use of local materials of good quality, and by a natural treatment of the many requirements of the premises, varying from perfect plainness in the mill and workshops to a freer handling in the warehouses, show-room, and principal entrance, a certain amount of architectural character has been attained.

The general contractor was Mr. Wm. Exley, of Broseley, Mr. Bailey, of Ironbridge, sub-contracting under him for the joiner's work; Mr. Boulton, of Burslem, supplied the engineer's work; Mr. Price has acted as clerk of works; and Mr. Lynam, of Stoke-upon-Trent, was the architect.

DEATH FROM DEFECTIVE CONSTRUCTION.

ON Tuesday last, Dr. Lankester held an inquiry at the Bank of England Tavern, Paddington, on the body of Edward Brewer, aged nineteen, killed by the falling of an ornamental balcony of the mansion, No. 3, Cleveland-square, Hyde Park. It is the second instance in which death has ensued from a balcony falling, under nearly identical circumstances, in the same square, within a few months.

Dr. Henry Reed said he resided at No. 3, Cleveland-square. Deceased was his servant, and on the morning of the 26th of January he went upstairs to clean the drawing-room windows. In a few minutes a terrific smash was heard, and Caroline Miles, the cook, went into the kitchen area, and found deceased lying there in a pool of blood. On witness going to the spot, he found that the balcony had fallen bodily with the deceased through the skylight covering the area. The damage done was so extensive that it appeared like a bombardment of the lower part of the premises. He believed that the balcony which had fallen was not properly constructed. There was little if any brickwork, no iron fastenings into the main building, and it was chiefly composed of cement and tiles. He believed that the balconies of the adjoining houses were all in the same defective state. He was only a yearly tenant, and therefore not responsible for repairs. He had been to Mr. Hudson, whose servant lost his life a short time since under similar circumstances, and Mr. Hudson informed him he had had his balconies put in repair.

Mr. Daniel Ruddle, architect, and superintendent of works at Burlington House, said he had examined the premises from which this balcony had fallen, and found that the window was 6 ft. wide. The flooring of the balcony was sound, but the capping was made with tiles and not fixed in the wall, but was away from it, and the joints, black with the weather, and liable to give way from the beginning. Instead of this the capping ought to have been fixed in the brickwork, which would have prevented the weather getting in. He believed that the work had been most improperly executed by a plasterer instead of a bricklayer or mason. There was no doubt, as is common in these cases, that the work was undertaken by a speculator, who let his contract to another, and in turn it was sub-let to a third party, each getting a profit out of the job. His belief was that the cement had become loosened by the jarring of the traffic, and that the young man, in stepping on to the balcony so constructed, had walked on to a trap, which fell with his weight.

The Coroner remarked that a large number of preventible deaths occurred in London by reason of those engaged in the building trade scamping their work, both in construction and material. This, however, occurred more particularly in respect to drainage, and in the majority of new houses the inhabitants suffered greatly from that source, until it was afterwards rectified at considerable expense.

Mr. Ruddle added that the same remarks applied to flues, and that a large number of the fires of the metropolis took place on account of defective flues in buildings, and his belief was that such was the main cause of recent large conflagrations. He thought it should go forth as a warning to the public where these ornamental balconies existed along the route to be taken by the Duke and Duchess of Edinburgh that, unless they were seen to, a fearful loss of life would result. Indeed, the owners or occupiers of the property where they had been erected ten or fifteen years ought to be compelled to have them tested and seen to at once, to avert such calamities as the present.

The Coroner remarked that there were district surveyors appointed under the Building Act, but he did not know that they were responsible for the safety of ornamental balconies. Certainly some one ought to be held responsible.

The jury concurred in these remarks, and returned a verdict "That the deceased was killed by the falling of a balcony at No. 3, Cleveland-square, improperly constructed," and added, "That, in the opinion of the said jury, the balconies in Cleveland-square were defective and dangerous, and that it is the duty of the Vestry to have them properly surveyed and put in order, so that a recurrence of such accidents as that to the deceased may be prevented."

MR. SCOTT RUSSELL'S DOME AND THE DISCUSSION THEREON.

SIR,—I read Mr. Scott Russell's paper on the Vienna Dome with a considerable degree of interest, personal as well as general, and the interest I felt was considerably increased when I came to read the discussion that took place upon his paper at the Institute of Architects. I think, however, the readers of the *Builder* have heard the views put forward by Mr. Scott Russell outlined before, and also the views put forward by two or three of the architects who joined in the discussion. I would ask the members of the Institute to refer back to the number of the *Builder* for March 23, 1872, to an article entitled "A Workman's Cogitations on Domes," and compare it with what has been ventilated at the Institute, by Mr. Russell and others, anent the possibilities of dome construction; and I think they must allow that somebody is indebted to somebody else. The article in the *Builder* speaks about domes in particular and general, domes developed from within and without a cone; domes in masonry without any hidden expedient for preserving their equilibrium; domes in iron, cast and wrought; domes composite and in concrete; and domes ordinary of timber. Even the subject of giving domes in their construction a certain entasis like the curve shown on the column of the Grecian order, was mapped out, and its utility, according to circumstances, advocated. There were also many other points alluded to in the article in the *Builder*, which a reference to it will show. Now, sir, it is said that congeniality of thought will produce similarity of expression; but whether such a marked congeniality of thought and expression be admissible when occurring in the persons of other men two years after the original thought and expression were made public, I will leave it for you to say.

C. H. C.

CAN ART BE TAUGHT?

ART cannot be taught; no amount of teaching will produce an artist. The use of the pencil and technical details may be acquired, but to produce original thought, and to implant new ideas, is beyond the power of the teacher, if the receptive faculty is wanting. But although the inventive faculty cannot be implanted in the mind; yet, if the embryo is there it can be developed and cultivated by education, when it would otherwise grow wild and produce no good fruit. The "old masters" had pupils, and they themselves had also been pupils; and such individual personal teaching is the best of all when conscientiously carried out. But now that matters are conducted at railway speed, who can spare the time?—who will take the trouble to pause at each roadside station, and expatiate upon the beauty of the scenery, or the geology of the district? The man of business cannot afford to loiter by the way; there can be no dallying by clear streams; no sauntering through pleasant valleys when business is on hand. This must be delegated to guides, having intimate knowledge of the localities, whose special duty it will be to accompany the youthful traveller in his journey, keeping him away from that which is obnoxious, leading him to that which is good and lovely.

"Circumstances alter cases," and the circumstances of the present time are very different from those of old. The railway has superseded posting, although that was by far the pleasanter mode of travelling.

SIGNET.

I THINK art can be taught. I believe it is only necessary to submit ourselves humbly and confidently to the dominant spirit of the nineteenth century to find ourselves endowed with a power of art as far transcending Mediæval and ancient as do our civilisation and our sciences. The arts of the Middle Ages are no longer possible, nor desirable;—would, indeed, be intolerable and unintelligible to us in any of their many forms of expression. The arts we require,—the only arts worth having, and the only arts which can live amongst us,—must be evolved from out the physical conditions of our being; spiritualised if you will, but not severed from the common wants and aspirations of modern civilisation. Let us begin anew by refusing to receive the cant of dilettanteism as the authoritative utterances of practical wisdom. Let us try to speak of art in such terms that all men may follow our meaning, and judge of our arguments; nor any longer persuade ourselves that we have acquired the knowledge and power of art when we have only learned to repeat, parrot-like, the senseless jargon of the schools.

The untutored artists of the East, familiar only with the harmonious combinations of nature, were colourists to whom Chevreul could have taught nothing,—painters whose instincts were more unerring than his laws of "complementaries." With us, however, these primitive faculties, once common to all men, have been subdued by ages of conventional culture, and the later exigencies of commercial and urban life; and if we ever again acquire that acute sense of beauty, which will alone direct us to excellence in art, it will be by exacting from *science, in the interest of all classes of society*, those forms, and colours and sounds, light and air, which nature long ago surrendered to the claims of civilisation.

It is not sufficient that we aggregate within our museums the art treasures of ancient, Mediæval, and modern times; nor that, few men discourse eloquently upon their never-more-to-be-attained excellences. These things may divert the minds of the leisured and learned few, but the nation at large will still hear only the discords, and see only the deformities amid which it lives and toils. For the practice of art special manual study is necessary, but correct taste can be acquired only by a process of unconscious imbibition through the senses from all the surroundings of life. Here, then, is clearly indicated the direction which our teaching and labours should take, and until we set ourselves earnestly to this work of social reform, I, for one, shall believe that our worship of art is a specious pretext, and our vocal prayers arrant cant.

Something in this direction we have unconsciously, and with other views, already done, in cleansing our streets and purifying our watercourses. Something also, with tremulous hesitancy, and sore misgivings as to the results, was achieved when we planted a few flowers within carefully-guarded ground of our public parks. Something more will be accomplished when, by the addition of reasonable accommodation in *seats* and *houses of refreshment*, we make them possible centres of popular recreation. And let us hope that we may ere long make yet another still greater advance in the same direction, when recognising the importance of Sunday as a day of rest and culture to the labouring classes, we admit them on that day to our national museums of science and art. Above all, let each of us also prosecute the work of reform within our own household, for who schools himself to look with indifference upon the ugliness of those objects with which his life is most closely associated, is not likely to acquire higher sensibility to things with which he is more remotely concerned.

C. H. W.

THE PERMANENCE OF OUR MONUMENTS.

SIR,—The public will, no doubt, be surprised, if not dismayed, at your discovery of the unfortunate state of one of Landseer's latest and noblest works, and which, being of bronze, might reasonably have been expected to be the most enduring. As the national buildings suffer in the same manner and from the same cause—the chemical ingredients in the London air—I should like to ask attention, as briefly as possible, to what I consider would be a remedy. If we look about us, what is the material—the only material, that resists decay? A glance at the York and Nelson Columns, London and Waterloo Bridges, furnishes the answer. These structures, which vary in age from forty to nearly 100 years, are of granite. I would ask, then, why not at once begin to use this material for our more important buildings? I find, after a careful inquiry and estimate, that extra cost cannot be maintained as the obstacle. It is only necessary to select an appropriate style, free from crockets, finials, and sunk carvings, all of which in London are only traps for soot, and begin to decay as soon as the workman has departed.

When we see the Houses of Parliament, Lambeth Palace, and Westminster Abbey, on the same day, in the restorer's hands,—when we think that there is scarcely an external stone remaining of the original Abbey,—that Henry VII.'s Chapel and the Temple Church have had to be entirely recased,—it will, I think, be admitted that it is time to accept the remedy I venture to propose, unless some other better one can be brought forward. Granite has been frequently used in the City and Westminster for partial details: if good for these, why not use it entirely, and so secure the perfect durability of our national buildings? It will then only be the fault of our architects if the coming New Zealander has not something to look upon that will reward his enlightened curiosity. I have no pecuniary interest whatever in this suggestion.

H. T.

"Shell v. Webster."—We are asked to say with reference to the last paragraph of our report of this matter, that although the statement of the benefits obtainable from the Society, is for the most part correct, Mr. Shell had not been a member long enough to claim them, and has not received any such assistance from the Society. Our reporter appears to have been wrongly informed. It is important this correction should be made as the impression given might damage Mr. Shell's application in another quarter.

THE WORD "WYK."

Two compounds occur to me as illustrative of Professor Van den Brink's position, viz., "Pallenswick" and "Bailiwick." The former is a place identical with Stanbrook-green, Hammersmith, which stands on the line of Roman road called the Portway, which ran from London to Silchester; the latter means the jurisdiction of a bailiff. Such forms as Wickham, Northwick, and Southwick are too numerous for notice.

Mr. Halliwell illustrates two forms of the same word, see "Archaic Dictionary," vol. ii., viz.,—1, *wick*, "a bay, small port, or village, on the side of a river"; 2, *wike*, "a house or dwelling." Both are from Anglo-Saxon: see Bosworth's "Dictionary,"—"*wic, wyc*, a dwelling-place, habitation, mansion, village, street"; also "a bay, creek," &c.

It is the same word as the Dutch *wijk*, "a retreat, refuge, quarter, parish"; and is found in all Low-German dialects, as Suio-Gothic, *wik*; Danish, *vig, viig*; Swedish, *vik*. Even in High-German we find *weich-bild*, "a precinct," but from a different source.

We have in England a tything named Aldwick, Pagham parish, Sussex, of sufficient importance in former days to have given its name to the whole hundred. It was clearly the first permanent settlement of the German tribes on this coast, before they obtained possession of Chichester.

Extending this analogy to "Via de Ald Wyk," I would remark that the oval in which is situated St. Clement's Church, always most forcibly suggests to my mind the shape of a Danish horse-shoe fort, such, for instance, as has given its name to Shoeburyness. We know that St. Clement Danes was a settlement of the Wickins, or Vikings, that is to say, pirates from the Baltic, in the time of Ethelwulf. The parochial buildings partly cover the course of a small stream, running thence to the Thames, down Milford-lane,—a creek, in point of fact, a vick or wyk, such as the true creekers loved.

It is not known where this stream rose. It may have been fed by the well dedicated to St. Clement, that has given name to Holywell-street, and also by springs in Clare Market.

Judging from the analogy offered by Chichester, it may be concluded that this settlement of Danes at St. Clement's was an ancient stronghold before they obtained possession of London, under King Canute. A. HALL.

CONCRETE IN LARGE BLOCKS.

SIR,—I read in the *Builder* to-day that a Mr. B. Blood Stoney, M.A., has been reading a paper on a new (?) application of concrete to sub-aqueous foundations, before the members of the Institution of Civil Engineers, viz., in very large blocks. As one who has advocated this method for the past ten years, let me repeat the trite axiom, "There is nothing new under the sun," and that the moles, or harbour-piers, in the tideless Mediterranean, constructed by a former generation on a similar principle, suggested to me the application of concrete for the above purpose. In its application to the piers of a Channel Bridge, in a competition design for Harbour Works at Jersey (*vide* "Rapports des Ingénieurs") I have publicly endeavoured to show the advantages of the plan, and placed my ideas before some of the leading members of the profession, the late Emperor Napoleon III., &c., and a notice also appeared in the "Mechanics' Magazine," of July, 1867. It is to be regretted that gentlemen, in their ardour to distinguish themselves, have not the candour to mention the source of their inspirations; and the designer of the new Tay Bridge also has adopted some of my published ideas and claimed them for his own. I understand a 1,000 ton block has been made in the new harbour works at Wick, N.B., but I have not heard the constructor claims for any new idea. Curiously enough, I laid my ideas on the subject before the Ministry of Public Works at Paris in 1865, and in the Paris Exhibition of 1867 I found a model of the arrangement for using 120-ton blocks, by the French Government Engineer in the New Mole at Brest.

EDMUND R. JONES,
Architect and Civil Engineer.

Lectures on Architecture at the Royal Academy.—We will publish Professor Edward Barry's first lecture in our next.

COTTAGE HOSPITALS.

Watlington.—The Cottage Hospital at Watlington, has been declared open by the Bishop of Oxford. There was a special service in the parish church, and a large number of the gentry and others in the neighbourhood attended. The hospital will make up six beds, and is in charge of a trained nurse. It is intended for the benefit of the sick poor in Watlington and the surrounding villages. The Countess of Macclesfield, the Rev. J. Slade (Vicar of Lewknor), and other benevolent subscribers, have furnished the requisites for its foundation.

Walsall.—The annual meeting of the subscribers to the hospital at Walsall, has taken place. The report showed that at the formation of the hospital ten years ago, it was contemplated to provide only four beds, but the institution had been extended till it comprised twenty-six beds, and the contributions had enabled the committee to spend 2,000*l.* in the purchase of the property upon which the hospital stands, and 1,177*l.* in the erection of additional buildings, leaving the premises free of debt. The hospital Saturday movement had produced 366*l.* 6s. 10d., making the total income on account of the building fund, 638*l.* 13s. 5½d., exclusive of 200*l.* which had been transferred from the general fund. 158*l.* 1s. 3d. had been spent on new buildings, leaving a balance of 680*l.* 12s. 2½d. in favour of this fund. The income on account of the general fund had been 1,282*l.* 5s. 11½d., including a balance of 131*l.* 8s. 9½d. from the previous year, and the expenditure having been 961*l.* 12s., a balance of 320*l.* 13s. 11½d. remained, 200*l.* of which had been carried to the building fund. Including 50*l.* subscribed by the miners of the district, the workmen's contributions had been 342*l.* 10s. 5d., as against 219*l.* 10s. 11d. in the previous year. The out-patients had numbered 2,809, and the in-patients 239; of the latter 171 were cured, twenty-eight relieved, sixteen died, and nineteen remained in the hospital at the close of the year. The chairman briefly congratulated the meeting on the position of the institution, and on the prospect of the committee being able to obtain sufficient money to defray the cost of the proposed new wing.

TICKHILL.*

THE derivation of this name from *th' wick hill*, "a fortified height," is improbable. It doubtless had its name (in Speed's Map, circa 1610, *Tyckhill*) from a stream which falls into the Sheaf. It may compare with Tickton, formerly Tichston, in the Liberties of Beverley, in the same county, and with the local names Ticehurst, Sussex, Tichbourne or Titchbourne and Tichfield, Hants; Tichmarsh, county Northampton; Titchwell, county Norfolk; and especially with Tickford, or Tykeford, in Bucks. The Greek word *potamos*, a river, first corrupts to *ptam*, or *tam*, whence the river names Tame, or Thame, Teme, Tema, Tamer, and the Tamesis, or Thames. By change of *m* into *v*, so common in the Celtic languages, and by other mutations and corruptions, the word is liable to become Tave, Taf, Tavy, Teifi, Tivy, Taw, Thaw, Tau, Thaya, Tay, Dee (compare Dundee; Gaelic, *Dùn-Tatha*, = hill on the Tay), *Taoua* (Greek), *Tavus* (Lat.), Thess, Tas, Tis, Tech, Tees (Latinised, *Athesis*; Italianised, *Adige*; Germanised, *Etsch*); also Tice, Tich, Titch. From the local name Tickhill we probably have the surnames Tickle, whilst from Tees-dale we get Tisdall. R. S. CHARNOCK.

* See pp. 126, 160, *ante*.

THE DWELLINGS OF THE WORKING CLASSES.

AT a meeting of the Metropolitan Board of Works, held last week, a memorial was presented from a meeting of working men, held in Denmark-street, Soho, which stated that thousands of them had been put to extra expense, inconvenience, and annoyance, on account of their dwelling-houses and tenements having been removed to make way for Metropolitan improvements. They rejoiced that the Board was engaged in making London healthier, both morally and physically; but, at the same time, great injustice had been done. They hoped that the Board would take into earnest consideration the erection of cottage or tenement residences adapted to the wants of those classes, who, through being compelled to reside near the place of their work, were obliged to live in cellars and garrets, much to their detriment morally and physically. The memorialists also desired to bring under the notice of the Board a plan for the issue of notes or tokens on the security of the Board, such notes to be paid instead of borrowed money to the contractors and workmen for the erection of dwellings, the notes to have all the value and uses of money; after the houses were inhabited a certain number of the notes, equivalent to the amount obtained for rent, to be called in and destroyed annually until the whole had ceased to circulate. The houses could then either become the property of the tenants, or be a source of revenue to the Board, and the memorialists declared that several building firms were prepared to accept such notes in lieu of gold.

Mr. Morgan, in support of the memorial, said the construction of railways in the metropolis had destroyed thousands of houses inhabited by the working classes. The Blackfriars Station of the London, Chatham, and Dover railway cleared away 600 houses. The Metropolitan Board of Works had greatly improved the metropolis, and the Board would, by the erection of dwellings for the accommodation of the working classes, still further improve the metropolis, physically, morally, and socially, by promoting the health and happiness of the people. Over-crowding led to a variety of evils, and the chief remedy was the erection of improved dwellings. The dwellings could be built on the plan proposed without cost to the Board, as he could point to the satisfactory working of the scheme in the case of the erection of a market-house and shops in the island of Guernsey at a cost of 4,000*l.*, and which resulted, at the expiration of ten years, in an annual income of 400*l.*, instead of having the rents consumed in interest.

The memorial was referred to the Works and General Purposes Committee.

THE DECAY OF LANDSEER'S LIONS.

IT is much to be lamented that our "Landseer Lions" at Trafalgar-square are apparently falling into decay; that many unsightly and damaging defects are daily becoming more visible cannot be denied by any one,—nay, not even by the creatures themselves, who, having kept the secret so long, with a sardonic smile now make known to John Bull how such matters are brought about, not by the so-called inferior metal being acted upon by our "ravaging London atmosphere," but by the inferior workmanship allowed in production. Examine us, they say, and see in how many pieces we are each built up. When modelled by our departed author, we were such that any skilled British founder would have proudly produced us in one cast; but alas! such was not to be our fate: we were given into the custody of Marochetti, who had an extraordinary price for casting us, and who, regardless of our protestations, at once commenced his work by anatomisation: sawing us up into a number of pieces to simplify the moulding; even our poor paws and tails did not escape his surgical operations. These parts were then cast separately, and afterwards fitted and riveted together on the same principle that boilers are made, yet, in a manner not anything so strong or close in the joints (this our bodies do willingly testify); and where it is a law with skilled workmen that the face or exposed side should be cast downwards to obtain solidity and sharpness of surface, no such compliment was paid us: hence our present honeycombed appearance, with gaping joints and holes, from which has dropped the wretched stopping, and it is possible that—

> "Greater ills may yet betide us,
> When Freedom's friends again bestride us,
> The pins be driven through the sockets,
> Our paws condensed and in their pockets;
> And whilst we are our fate bewailing,
> Some rough will have our tails retailing."

To prevent this shocking re-enacting of Leicester-square, something should be done, and especially to the Lion opposite the Sun Fire Office, whose left paw is a failure casting. The joints should all be burned together by molten metal until the parts are homogenously connected. This would, if properly accomplished, considerably improve the condition of the work, although it can never make them what they would have been if properly founded.

METALLIST.

NEWBURY CATTLE MARKET, BERKS.

THE demand for covered accommodation is already so great at this newly-erected market, that it has been decided to erect additional covered boxes and pens. This, however, is only the carrying out of a part of the original plans and designs of the Newbury Local Board, as submitted by their architect, Mr. James H. Money, who is pushing on the additional works for completion in two or three weeks.

WIDTH OF ROADS UNDER METROPOLITAN MANAGEMENT ACT.

AT Westminster, Colonel Clifford, of William-street, Albert-gate, attended before Mr. Woolrych on a summons, at the instance of the Metropolitan Board of Works, charging him with an infringement of the 98th section of the Metropolis Local Management Act, 1862, which provides that no existing road, passage, or way, being of a less width than 40 ft., shall be formed or laid out for building as a street for the purposes of carriage traffic, unless it should first be widened to the full extent of 40 ft., the measurement to be taken half on either side from the centre of the roadway to the external wall or front of the houses or buildings erected or intended to be erected on each side.

The evidence was to the effect that in August, 1872, Colonel Clifford purchased of Mr. Mitchell Henry, M.P., for 15,000*l.*, a piece of freehold land on the Kent House Estate, in Knightsbridge. Upon it he built four houses, the frontage of which is in a new road recently formed upon the estate. The width of the roadway opposite his land is about 50 ft., while the rest of the road is of the regulation width of 40 ft. At the rear of the Colonel's land, and between it and South Lodge, the residence of Baron Henry de Worms, is a turning from the Knightsbridge-road. The Baron's house is reached from this street, which is a *cul-de-sac*, and, to all intents and purposes, a private carriage-way. The roadway averages about 12 ft. in width, but at the further end is a sweep of 22 ft. wide to enable carriages to turn. The land of Colonel Clifford has a frontage on South-place of 88 ft. out of 261 ft., its entire length, and the remainder is the frontage of a plot of land belonging to Mr. Frederick Sang, and intended for building purposes. Colonel Clifford, wishing to utilise the whole of the land that he had purchased, commenced erecting some stabling at the rear of the houses, which will project to a certain extent into South-place, and narrow the sweep in the carriage-way. To this the Board of Works, at the instance of Baron de Worms, objected, and contended that as Colonel Clifford was substantially creating a new street, it must be of the width of 40 ft., as provided by the Act. The Colonel having purchased all the rights of the owner, and believing that he was acting perfectly legally in the matter, continued to erect the stabling, and the Board now summoned him for an infringement of the Act.

Mr. Woolrych, in the end, dismissed the summons, on the ground that the Board had failed to prove that anybody intended to form a street in South-place, or that Colonel Clifford joined or concurred in that intention.

Mr. Philbrick intimated that the Metropolitan Board would appeal against the decision. (Since abandoned).

Mr. Murphy, Q.C., asked for costs.

Mr. Woolrych, observing that both parties came before him with clean hands, arranged with the counsel that the costs should follow the result of the action in the superior court; but that if no appeal was lodged within a reasonable time, the Board should pay the costs of Colonel Clifford in the proceedings.

SCHOOLS OF ART.

Bradford Mechanics' Institute School of Art.—A *soirée* in connexion with this school has been held in the lecture-hall of the Institute. Mr. C. Semon, the president, occupied the chair. There was only a moderate attendance. The President, in opening the proceedings said that the exhibition had been eminently successful, and had realised nearly 3,000*l.*; so that the Institution was now almost out of debt. A few hundred pounds more would entirely free the building from any incumbrance, so that the Council would be able to apply all their money to the purposes for which the Institution was formed. They were assembled to-night for the purpose of distributing the prizes in the Art department. They had been prevented doing this at the annual *soirée* of the Institution. While they were perfectly satisfied with the attendance and progress of those who had already joined the Institution, they thought that the accommodation which was provided by the Institution was not, in general, so much used as the Council would like to see, and he thought that many more in the town might with advantage attend these classes. It was gratifying to find that the reports which they had received spoke favourably of the work of the students. Mr. Tom Taylor, who distributed the prizes, ably addressed the meeting. He commenced by referring to the great disadvantages under which the study of art was carried on in large manufacturing districts like those of Yorkshire and Lancashire. Nevertheless, in spite of all these disadvantages there was a craving for love of art among our toilers. The want of a knowledge of art had lately been very strongly felt in consequence of the competition of foreign countries in our manufacturing processes becoming more and more threatening, this competition being to a great extent the result of a better knowledge of art being acquired by the artizans of continental countries, than was obtained by the workers of our own country. It had been attempted to meet this want by the establishment of schools of art, such as the one connected with their Mechanics' Institution in their large towns, and the result had been a very great advance in the beauty of the design in connexion with some of our manufactured goods. Thus our art-teaching, though far from perfect, as art-teaching in this country had been acquired, was far better and more perfect than it was thirty years ago. Mistakes had no doubt been made, but he hoped that in our very mistakes we should find instruction. Our schools of art were now numbered by hundreds. It had, however, just dawned upon the country that art was a portion of education. The time was not distant when the idea of twenty schools of art, or the collection of such a number of casts and models as were to be seen in that building, would be looked upon as a chimera. Mr. Taylor then gave at considerable length some valuable advice to art students, pointing out the faults into which they were likely to fall.

The Cambridge School of Art.—The annual meeting in connexion with this school was held in the large room of the Young Men's Christian Association. The chair was occupied by Mr. F. A. Paley. There was a good attendance. The secretary, Mr. Fawcett, read the report. The number of students, it stated, had slightly increased, and the success of the school in the Government competitions had been about equal to former years. The committee pointed with pleasure to the signal success of the Exhibition of Art and Industry just closed, and trusted that the impulse thus given to the study of art would result in an increased willingness to use the opportunities afforded by the School of Art. The Rev. Professor Selwyn then addressed the meeting. A great advance, he said, had been made in twelve months, for the students had ceased to exhibit want of care, and were noted for their carefulness and accuracy. A good master always inculcated the necessity of working well with their pencil at common objects. They must not dash in the colour until they had got a steady hand and good eye for accurate outline. They might delineate all kinds of things—a hamper, a table, a chair, a common wine-bottle, or a decanter, so as to acquire facility in truth of form—roundness—light and shade. Out of such ordinary materials as these, a portion of "still life" might be obtained; but how much more necessary was it to cultivate the qualities he had mentioned, in order to represent things in nature, with the representation of which they were probably less familiar, but which proved so attractive in the shape of landscape and scenery. It was not "magnificent scenery," or a "splendid view," that alone displayed the powers of the artist. There were charming bits of nature in the Fens, and the country had a beauty all its own. This had been abundantly shown by "Old Crome," in his painting of Norfolk scenery,—whether of a river-steamer, ready for a "water frolic," with a gorgeous sunlit sky reflected in the river, or a picture with no more prominent objects than a willow or cattle grazing in the Fens. Professor Selwyn related some interesting anecdotes of this artist, one of whose works, which he possessed, and had previously belonged to Mr. R. R. Rowe and the late Bishop of Ely, had been the subject of considerable controversy, raising the point, *inter alia*, as to the date when river-steamers first came into vogue, a question settled by a Norwich newspaper, giving an account of the launch of one of these steamers five years before "Old Crome" died. We had not much to boast of in our scenery; but little was wanted if there was diligence on the part of the student. Gainsborough came from the little Suffolk town of Sudbury, and had made the world feel the quiet power of pictures of rural scenes and life,—cottage children, as they were seen at play, and village people at their usual rustic occupations. He studied nature in the south part of that county—not a very attractive locality—and his work was much improved when he went to the Lakes. Professor Selwyn proceeded to say that he did not intend to give them a professorial lecture, unless they wished it; but he preferred to give them some few hints and gossip that would amuse as well as instruct. He then went on to speak in chatty style of art and artists—painters and painting—of Raffaelle, Leonardo da Vinci, and Michelangelo, their trials and their successes—of Sir Joshua Reynolds and his writings—of the Duke of Wellington and his portrait-painters;—of the principles and practices deducible from their lives. Finally, speaking of the sculptor, Thorwaldsen, and his saying, "I am afraid I shall never make another good statue, because I was satisfied with the last;" Professor Selwyn said from that might be gathered the great principle which should animate them in art, and in every walk of life—never to be satisfied with the work accomplished, but to go and do something better and higher.—Mrs. Fawcett, at the request of the chairman, handed the prizes to the successful competitors.

METROPOLITAN BUILDING ACT.

CLAIM FOR EXEMPTION.

ON the 25th ult. Mr. Garnham, builder, was summoned by the District Surveyor of Shoreditch before Mr. Hannay, the sitting magistrate at the Worship-street Police-court, for erecting a building, enclosed with timber and boarding, and roofed with felt, in Maria-street, Kingsland-road. The District Surveyor proved that the building was erected without any notice being given to him, and it was about 14 ft. long, 10 ft. wide, and 9 ft. high, and was used as a stable. It stood on ground belonging to the North London Railway Company, who had let it, together with one of the arches of the railway viaduct, to a cab proprietor. The building in question was outside the arch of the railway viaduct, against which it abutted on one side. The District Surveyor contended that the building was not exempt as it was not used for the purposes of the Railway Company, and called the attention of the magistrate to the 12th clause of section 6; he also referred to the case of the South-Eastern Railway Company *v.* Badger, in the Court of Queen's Bench, and mentioned that several cases had been decided by other magistrates in the manner for which he contended. In reply, the defendant stated that he had always understood that any buildings standing on the ground belonging to the Railway Company were exempted from the operation of the Act, and that the former District Surveyor of the parish had so informed him. After considering the cases referred to, the magistrate decided that the building was *not* exempt, and made an order for the amendment of the work in 14 days, with 4*s.* costs.

FEES UNDER METROPOLITAN BUILDING ACT.

MR. EDWARD SIMMONS, of the Trafalgar-road, Greenwich, was summoned before Mr. Patteson, at the instance of the Metropolitan Board of Works, to show cause why an order should not be made upon him to pay a sum of 4*l.* 9*s.* 4*d.*, being the amount of fees in respect of a certain dangerous building under the Metropolitan Buildings Act.

Mr. Bevan attended in support of the summons, and Mr. Saw for the defence.

It appeared that in 1871 a building, occupied by a person named Davis, was reported as being in a dangerous condition, and the same was surveyed, and hoarding and shoring constructed for the public safety, the premises being sublet at the time to Davis. At the time of the expense claimed being incurred, the Metropolitan Board summoned Davis to this Court and obtained an order for payment of the amount. This order, however, was not enforced against Davis, as it might have been by a distress warrant against his goods, or a commitment to prison, the Board excusing him on account of his poverty. The present summons had now been taken out under a section of the Metropolitan Building Act, declaring the owner of such property to be the person in receipt of any part of the rent and profits of such property.

Mr. Saw said that the present defendant was merely the agent of the person, a lady, who was the real owner of the property at the present time, and the latter had no control over the property at the time the expenses claimed were incurred. He submitted, however, that an order having been obtained against the occupier, who was liable to be sued as the owner, and not enforced, it was not competent for them to take ulterior proceedings against a second person in the same manner.

Mr. Patteson held that the Board having abandoned enforcing the order previously made there was an end to the claim, and dismissed the summons.

Mr. Saw asked that costs might be allowed, but this was refused on the ground that the property had been benefited by what had been done.

NEW BRIDGE, NEAR BIRMINGHAM.

WE understand the directors of the London and North-Western Railway have accepted the tender of Mr. S. Woodall, of the Windmill End Boiler Works, near Dudley, for the erection of the new foot-bridge, at their station, New-street, Birmingham. The new bridge will be constructed with large wrought-iron lattice-girders, supported on bar-iron columns, with moulded caps and bases of a Classical design. The whole of the work will be carried out under the supervision of Mr. Henry Woodhouse, of Stafford, the company's chief engineer, Mr. T. C. Sharp being the assistant engineer.

LAST AUTUMN'S PICTURE EXHIBITION AT LIVERPOOL.

THE corporation of Liverpool have issued in a printed form the report of the Fine Arts Committee upon the third Autumn Exhibition of Pictures, 1873.

The exhibition was opened to the public from Monday, September 1st, to Saturday, November 29th, during the day, at a charge of 1s., and in the evening from Monday, October 13th, to Saturday, November 29th, at 3d.

The number of admissions by payment at the door amounted to 13,318 in the morning and 18,361 in the evening, making a total of 31,679, besides 523 season tickets, and about 10,000 pupils of educational establishments admitted gratuitously.

The number of works exhibited consisted of 454 oil-colours, 568 water-colours, 35 pieces of sculpture and other works of art; forming a total of 1,057.

Of these, 972 were for sale, and 271 were actually sold for sums amounting to 7,402*l.* 17s. 6d., 787*l.* 10s. being expended by the corporation in pictures for the permanent Gallery of Art now in the course of formation. The total receipts amounted to 1,566*l.* 1s. 3d., leaving a profit of 466*l.* 1s.

The large increase of season tickets, viz. 523, as against 332 in 1872, says the report, demonstrates the existence of a rapidly-increasing section of the public who return again and again to study the pictures carefully, and who will in time form a body of independent and cultivated art opinion, the effects of which must be most advantageous to the town.

Hitherto the committee had been somewhat disappointed at the comparative apathy of the artisan class, but this last year the attendance in the evenings had been very hopeful.

The increase in the value of sales was also a subject of congratulation, especially as regards the local artists. Out of 7,402*l.* 17s. 6d., the local sales amounted to no less than 1,704*l.* 1s. 6d.

The general standard and character of the works exhibited again evinced a decided improvement, and more especially as respects local artists. Both in character and number their works showed a decided and very encouraging advance upon previous exhibitions.

HYDRAULICS.

SIR,—Referring to the excellent leading article of last week on "Our Knowledge of Hydraulics," permit me to state that our English modern hydraulic formulæ are not so inapplicable to the calculation of the volume of the flow in large rivers as Mr. J. J. Révy would appear to have considered them.

Applying the formulæ given in one of our best text-books, — Professor Rankine's "Civil Engineering,"—in which the depth of the current, of course, forms one of the most important functions in the calculation of the velocity; to obtain the surface velocity of the La Plata River, and, using the data given by M. Révy,—viz., the greatest surface inclination as ·444 in. per mile, and the depth of the current as 24 ft.,—the result arrived at is 93 ft. per minute, or but slightly less than that observed by M. Révy; and, allowing for possible unobserved inequalities in the bed of the river, and the difficulty of obtaining the inclination of the surface with mathematical accuracy, the small difference between the amount calculated and observed is most probably due more to the want of exact mathematical accuracy in the data furnished than to error in the formulæ. J. K. MANN.

BELLS AND BELL-HANGING.

Fressingfield.—The peal of eight bells in this parish have recently undergone a complete restoration. They have been taken up and entirely re-hung upon improved principles, fitted with new wheels, new stocks, and pulleys, also new brasses fitted into cast-iron chairs, and all new ironwork; the sixth bell has been tuned, and the tenor quartered, so that the clapper strikes the bell in a different part. The bell-frame, which was very much out of repair, has also been restored with new oak timber and ironwork.

Barnard Castle.—The machinery of the bells at St. Mary's Church, Staindrop, has for some time past been in an impaired condition, together with the bells themselves; the continued beating of the tongues from side to side having seriously cupped them. When Mr. Mallaby, turret bellhanger and founder, of Masham, Yorkshire, inspected them, his opinion was that they required immediate attention,—and he advised the discontinuance of peal-ringing for chiming, and even that only at intervals. In the interim negotiations were entered into by the vicar and churchwardens with Mr. Mullaby, resulting in the bells being thoroughly put into order, and new appliances provided. The bells are much improved in tone, the tenor especially (14 cwt.). The clock has also been made to re-strike on this bell. These musical bells are in the key of "G," and (for their size) are considered unsurpassed in the North; but there are indications of one of them being likely to crack at no distant date. The fifth bell bears date 1685, and was cast by Sellars, of York; the other five are more recent (1767), and were cast by Chapman, late Myers, of London.

CONSTRUCTION OF TANKS.

HAVING to construct a brick tank, 100 ft. diameter, and 20 ft. deep, I am desirous of putting in as little material as possible (consistent with perfect safety), to withstand pressure of water that will be brought to bear upon the walls when the tank is entirely filled with water. Can any of your correspondents favour me with a simple and definite formula for obtaining the thickness of wall at base, also thickness at top for the above size, or rule applicable to any size of tank? H. M.

CAUTION TO ARCHITECTS.

SIR,—I shall feel obliged if you will allow me, through the medium of your columns, to caution your professional readers against a female begging impostor, who has lately called upon several London architects, and after telling a plausible, but ingeniously diversified story of her distress, has solicited assistance, and perhaps received it in more than one instance.

In carrying on this fraud she has not hesitated to use the names of several members of this Institute by way of introduction; but, I need scarcely add, without the slightest authority.

It would be useless to guess her own name, as she has evidently more than one "*alias*."—I am, Sir, &c.,

CHARLES L. EASTLAKE, Secretary, R.I.B.A.

DAMAGES TO OPIUM-SMOKING SHOPS.

IN the Sheriffs' Court, Red Lion-square, Feb. 24, before Mr. Under-Sheriff Burchell and a special jury, the case of Summerfield *v.* The East London Railway Company has been decided. This was a claim for compensation.

The claimant, a tailor at Pentonville, had an interest of 18½ years in a lease of several small houses, let out at 4s. per week, containing two rooms, one upstairs and one down. Two of the houses were let to persons whose places were visited by opium-smokers, and in the house opposite was the room engraved in "Edwin Drood." The places had been visited, as described by the claimant, by many gentlemen to see the opium-smoking, and his mother, who was called, said the Prince of Wales and others had been to the spot to witness the opium-smoking. Sir John Karslake and Mr. Garth said they had been to the locality in reference to the present inquiry. The mother of the claimant asked Sir John if he had seen the woman opposite who kept the smoking department, and he said he had not, on which she replied that he had lost a treat. It appeared that Chinamen and other foreigners resorted to the two houses in New-court to smoke opium. The houses were old in New-court, formerly called Bluegate-fields, and afterwards Victoria-street.

The claim on the part of Mr. Summerfield was to about 300*l.* by damage done to the small houses by the tunnelling of the company, and he had lost a number of lodgers, who paid him 2s. per week for each room. Two Englishwomen, one of whom had married a Chinaman and another a "gentleman from Madras," were the only persons keeping houses in the court to which foreigners went to smoke opium.

The case on the part of the claimant was, that since the operation of the railway works the houses had been much damaged, and the tenants were afraid to stop in them. Even the opium-smokers had declined to come on account of the condition of the place.

On the part of the company, the case was that very little injury had been done to the houses in question, and it was alleged that, by age and the want of repairs, they were in a dilapidated condition before the railway works were commenced.

Witnesses were called on both sides, and the inquiry occupied the day.

Mr. Under-Sheriff Burchell, in placing the case before the jury, who had in the morning paid a personal visit to the spot, told them that, on one side 638*l.* was alleged as the amount of damage, and on the part of the company from 30*l.* to 40*l.* Another question for compensation was the loss of rent.

The jury assessed the compensation at 220*l.*

ACCIDENTS.

Fatal Fall from a Chimney.—During a late gale the top of a lightning-conductor, attached to a chimney 40 yards high, at the works of Messrs. Schofield & Kirk, machinists, Huddersfield, was blown off, and Mr. Ives was commissioned to remove the old lightning-conductor and put another one up. The usual method of fixing a portable ladder up the outside of the chimney was resorted to, and the climber, Mellor, ascended it for the purpose of completing the fixture. When he had got above 80 ft. from the ground, he swung round to get to the back of the ladder. Scarcely had he done so when the holdfast supporting the ladder gave way, and he fell to the ground, and was killed on the spot.

A Surveyor killed on a Railway.—On the Lancashire and Yorkshire Railway at Gilnow, Mr. William Tuke, surveyor, Pendleton, together with two assistants, were surveying preparatory to widening the line and constructing sidings. Mr. Tuke was walking across the line looking for a mark which he had made, when a passenger train from Bolton came up unobserved, and he was struck over the left eye by the buffer of the engine, hurled beyond the metals, and killed upon the spot. The deceased, who was between 50 and 60 years of age, leaves a family.

THE GLASGOW IMPROVEMENT ACT.

THE Lord Provost of Glasgow attended a meeting of the special dwellings committee of the Charity Organization Society, on May 7, 1873, and made a very interesting statement with reference to the working of the Glasgow City Improvement Act. The Act was passed in 1866, and gave the city council, who were appointed trustees for carrying it out, power to raise a million and a quarter; of this upwards of a million has been raised and expended, and though the trustees nt first expected to lose 200,000*l.*, it seems probable that there will be no loss at all. Notes on the subject have since been taken by the Rev. R. J. Simpson, for the council of the society during a late visit to Glasgow, and the following is from these notes:—One of the lieutenants of Captain McCall, the chief constable of the city, stated that the effect of the clearances that had been made by the Act upon the detection, and therefore on the prevention, of crime, was of a most extraordinary character. He drew attention to one spot of some thirty square yards in the Old Vennel (now entirely cleared), on which many murders had undoubtedly been committed, the authors of which had not been brought to justice. The police dared not attempt to enter such dangerous dens as these unless in considerable force, and then at great risk. The worst of them have now been broken up and cleared away; the criminal or vicious have either fled the city, or taken up a temporary residence in some of the low tenements that still remain, or in the thieves' lodging-houses; but in either case they live far more under the surveillance of the police, and within the reach of justice.

It has been a commonly received idea that the extensive demolitions undertaken in the course of the improvements had inconvenienced the poorer classes by forcing them to remove, without providing them with dwellings elsewhere. But it can be shown that since the Trust began business in 1866, down to July, 1873, the houses sanctioned by the Dean of Guild Court within the municipal boundaries alone were 21,517, capable of accommodating something like 100,000 persons. The conclusion to draw is, therefore, that houses have been built much faster than they have been pulled down, so that no hardship can have arisen.

The committee have only found it necessary to exercise their powers of reconstruction so far as to build one model lodging-house for single men, and one for single women. These were erected on the site of a mass of buildings called the Rookery. From this fever was never absent; but not a single case of epidemic disease has occurred in the lodging-houses since their erection, four years ago. In a commercial point of view, these lodging-houses, containing 228 beds (to be increased to 300) and 96 beds respectively, have been great successes. Each inmate has a separate bed, partition, and furniture, the use of good common dining-room and good kitchen. Money was borrowed for them at 4 per cent., and they pay 5½ per cent.

I cannot, says Mr. Simpson, conclude these remarks without expressing my unqualified conviction that no more sure and certain means could be adopted for the social, moral,—ay, and religious,—elevation of a great city than those which the operation of the Improvement Act has brought to bear on the city of Glasgow.

Margate Drainage Competition. — A descriptive report or summary of the competitive schemes for draining the borough of Margate has been prepared by Mr. P. B. Coghlan, C.E., the borough surveyor, and printed by order of the local council.

CHURCH-BUILDING NEWS.

Newcastle-upon-Tyne.—At a meeting of the ratepayers of the parish of Westgate, held in the vestry of St. John's Church, Newcastle, the desirability of extending the Elswick Cemetery has been considered, and it has been agreed that it requires to be enlarged, and that the joint Burial Board of St. John's and Elswick be authorised to purchase the additional ground required. The vestry has sanctioned the purchase of a field of about six acres, lying on the west side and adjoining the present cemetery (subject to the approval of the Secretary of State), at 500*l.* per acre, borrowing such sums of money as may be necessary for the purpose, and for the enclosing, laying out, and draining the same, not exceeding the sum of 3,600*l.*; the cost to be levied on the three parishes.

Bishop Wilton.—St. Edith's Church, Bishop Wilton, was restored some fourteen years ago in a plain manner, but it has recently undergone a process of decoration. The entire cost, which is considerable, has been defrayed by Sir Tatton Sykes, bart., who has also promised to fill in the whole of the windows with stained glass; at the present time the west window, of three lights, and the chancel windows in the east wall, being the only ones of stained glass. Sir Tatton Sykes has also presented to the church a brass corona of thirty lights, and it has been suspended from the roof in the centre of the nave. Another corona of similar character, but somewhat smaller, will shortly be provided for the north transept by the hon. baronet. The work being completed, the edifice has been cleared of the scaffolding, and re-opened for divine service.

Longburton.—The parish church of St. James the Great, Longburton, three miles from Sherborne, Dorset, has been reopened by the Bishop of Salisbury, after a reparation, partial rebuilding, and the addition of a new north aisle. The work has been carried out by Mr. W. Farrall, of Sherborne, builder, at a cost of about 1,250*l.* Mr. Wingfield Digby, of Sherborne Castle, who owns a large portion of the parish, and is lay rector of the church, bore the whole expense of restoring the chancel, and also contributed a donation of 100*l.* to the general fund. The patroness of the living, Miss Cosens, of Glenwood, Longburton, gives a new east window of stained glass and 100*l.* to the fund; Sir Richard Glyn, bart., of Lewesto, 50*l.*; and the Church Building Society, 75*l.* The vicar of the parish, the Rev. C. H. Mayo, M.A., contributes 100*l.* The parishioners and others also subscribed. It was a fifteenth-century church, in the Perpendicular style; but traces of Norman work were found imbedded in the walls, and these fragments have been reset. The square tower has been underpinned an faced with new stone. The new open benches are of stained and varnished deal, and there is a new Ham stone pulpit, with small Devon marble shafts.

Ewhurst.—At Ewhurst Park, the seat of Mr. W. H. C. Plowden, the small church, which is situated on the north side of and contiguous to the lawn, has been undergoing a renovation, and has been re-opened for public worship by the Bishop of the Diocese. The pulpit was given by the Rector; the font, by Mrs. Pole; the harmonium, by Miss Plowden; the reading-desk, by the Rev. J. Fuller (Ramsdale); the lectern, by the Rev. E. A. Gray, late curate of Ramsdale and Ewhurst. The windows in the chancel are in memory of members of the Plowden family, who are buried in or near the church. These windows and the reredos, are by Messrs. Lavers, Barraud, & Westlake; the transept window is by Horwood, of Frome; the carver of the woodwork was Mr. Turrill, of Reading; all building in stone, and carving of same were done by Wheeler Bros., of Reading; the remainder of the building and the oak work were by Mr. Garrett, of King's Clere; the heating-apparatus was by Mr. Haydon, of Trowbridge. Mr. Smith, of Reading, was the architect.

Gateacre.—The new church of St. Stephen's, Gateacre, has been consecrated by the Bishop of the diocese. The church, which is in the Early English style,—the architecture consisting of a nave, two chancels, and a spire,—is situate in the centre of the village, and will accommodate 500 people. It has been built entirely by the voluntary subscriptions of gentlemen of the neighbourhood, while several donations have been made for the following purposes:—By Mr. Alfred Fletcher, of Allerton, for lining the chancels with stone; Mr. Ed. Gibbon (the largest contributor to the church), donations for the spire and communion-plate; and Mr. R. Brocklebank, the rails and gates. The church was built from the designs, and under the superintendence, of Mr. C. Sherlock. The site was given by the executors of the late Thomas Dutton. The sole contractors were Messrs. Dutton & Gore, and the heating apparatus was fixed by the proprietors of the Eagle foundry. The total cost of the edifice is about 4,500*l.*

Books Received.

The History of the Pianoforte. By E. BRINSMEAD. Cassell & Co.

THIS is a small book, which might with advantage have been smaller, as no little proportion of it is taken up by mere padding about the history of music, anecdotes taken from well-known musical biographies, &c. If the portion describing the development and principles of pianoforte mechanism had been published in a simpler form, as a pamphlet, it would have been more to the purpose of the reader; as a short concise description of the construction of the instrument, and the peculiar accidents to which it is liable from age or ignorant treatment, would have been practically useful to many people. It is to be presumed that the author represents the firm of Brinsmead & Sons, pianoforte manufacturers, and perhaps we, without being censorious, infer that a main object of its publication is to draw attention to the superior excellence of the Brinsmead piano over any other. This is not done in quite so barefaced a way as in some other essays of the same kind (as in a work on organs which we noticed a little while since); but it cannot be expected that such books will be regarded in the same light, or be placed on the same footing, as if they were written by those who have no trade interest in the subject treated of. Still, when all is said, this is a pleasant little book, and may be usefully read by those who know nothing about the subject.

An Introduction to the Elements of Euclid: being a familiar Explanation of the First Twelve Propositions of the First Book. By the Rev. STEPHEN HAWTREY, A.M., late Assistant Master at Eton. London: Longmans, Green, & Co. 1874.

THREE hundred years before Christ, when Euclid wrote his great work, the Alexandrians, though great philosophers, had neither School Boards nor Infant Schools, so far as we know; and a work such as Euclid's was written for maturer and more masculine intellects than those of the general run of boys and young women. Since abstruse learning such as Euclid's, however, is desired to be instilled into the tender brains of growing children of the nineteenth century, nothing can be more reasonable than to help such minds to a better knowledge of the elements of geology than Euclid alone can give, as by teachings better adapted to the capacities of the young of an earlier age than his Introduction to geometry was intended to enlighten. It is for this purpose that Dr. Hawtrey has been led by long experience of the youthful mind at Eton, to prepare the Introduction to Euclid's Introduction now under notice. It is written in a familiar style, just such as the conversational mode he has found to be best adapted to the purpose in view. It is a new kind of schoolbook, consisting, in fact, of *printed* conversation, lucid and helpful, in a kind and pleasant way, interspersing what is written with illustrative stories, just such as he used to talk with his pupils. The teacher's wish is so to write as to draw on learners to try to master the subject for themselves; in a word, to teach learners how to learn Euclid; and we think it likely to be of benefit to schools, and to education generally.

Flowers and Festivals; or, Directions for the Floral Decoration of Churches. By W. A. BARRETT, of St. Paul's Cathedral. London: Rivington.

IT will be enough to say that a second edition has been published of Mr. Barrett's manual. It is a pretty little book of its kind, but this sort of thing is being overdone, and leads innocent devotees by logical sequence to error.

VARIORUM.

MR. STANFORD has published, as usual, a map showing all the projected works in the metropolis for which Bills have been deposited. He has also issued a good Special Map of the railway stations and tramways and the postal districts in London and its environs.——The railways in and around London are now so numerous that to make the best use of them a map is essential. Several have of course been published. We may specially mention for its clearness, "London Railway Travelling made Easy," by Robt. J. Cook.——The March number of the *Contemporary Review* includes Professor Huxley's Address, as Lord Rector of the University of Aberdeen.——We get a word or two as to *a Function of Lichens*, from the current number of the *Popular Educator*. "Lichens exist exclusively on atmospheric supplies, requiring only air, sunlight, and some degree of moisture for their support. The simplicity of their structure enables them to exist at altitudes where the air is too thin for the support of plants of the higher orders of vegetation, so that they are found in abundance even at the very verge of the limits of perpetual snow. Lichens, with mosses, serve as pioneers of vegetation, having the power of acting on the stones and rocks below them, so as to produce small hollows in which moisture collects; then comes the frost, that seizes on the moisture which has forced its way into the little crevices already formed, and splits the rock, so as to cause it to moulder away; and this process, which is continually going forward, by degrees prepares a soil fit for the nourishment of larger plants." —— And from another part of the same publication our readers may get an insight into the chemistry of Soap:—"If oily matters be mixed with water they will rise to the surface; but if the water contain an alkali, the oily matter will go into solution, forming an *emulsion*. When this solution is boiled for some hours, it becomes clear, being a solution of *soap*. By adding common salt, a curdling is produced. The curds rise to the surface, which, when collected and pressed, form soap; the glycerine remaining in the clear liquid soda, which is the alkali used in *hard* soaps and potash in *soft* soaps. *Curd soap* is made from tallow; common *yellow* soap from tallow and palm-oil; a quantity of rosin being added, which combines with the alkali, since it possesses acid properties. *Mottled* soap is set to cool in cast-iron moulds, and the mottling is due to the separation of an iron soap,—that is a body in which iron oxide is the base combined with the fatty acid. Soaps formed with the alkalies are soluble in water; not so those formed with the alkaline earths. It is owing to this fact that soap curdles in *hard* water. Such waters generally contain calcium and magnesium salts, and when soap is dissolved in them, a double decomposition occurs. The alkali of the soap joins with the acid combined with the calcium, while the calcium unites with the acid of the soap, thus forming a soap which is insoluble, and which, therefore, appears as curd."—— "Animals and their Young," by Harland Coultas, is another of the pretty and instructive books for children, published by Messrs. Partridge & Co. It is illustrated by Mr. Harrison Weir, and Nicholson, a pupil of William Bewick.——Messrs. Chatto & Windus announce "The Cyclopædia of Costume; or, a Dictionary of Dress, Regal, Ecclesiastical, Civil, and Military, from the earliest Period in England to the Reign of George the Third," by Mr. J. R. Planché, *Somerset Herald*. The work will include notes of contemporaneous fashions on the Continent; and be preceded by a general history of the costumes of the principal countries of Europe. It could not be in better hands. —— "Sketches of Spain and the Spaniards during the Carlist Civil War" (Collingridge), is the title under which Mr. Charles L. Gruneisen has published a lecture he delivered recently in the Shire Hall, Hertford. It gives an interesting account of a stirring period, and at the present moment, when Spanish history is repeating itself, it is peculiarly *apropos*. Mr. Gruneisen's opinions may be gathered from the concluding sentences of his lecture:—

"The Republicans will never subdue the Basques, for if Don Carlos was to fall through bribery, like his grandfather did, the civil war would recommence with another claimant. Don Alphonso has a chance, through the army south of the Ebro, but not the most remote one in the north. It is terrible to think of the troubles of poetic Spain, the garden of Europe, the land of romance, with a type of music peculiarly its own, of indescribable charm; with mines rich in gold, silver, quicksilver, iron, and copper; with vines producing the richest wines; with natural orchards growing the most luscious fruits; with national dances, exhilarating and exciting; with galleries of pictures containing some of the gems of the world; with attractions for the architect and the archæologist, and with scenes for the painter, grand and picturesque; with a noble race of mountaineers, with chivalrous and courteous cavaliers, with a race of pure and fascinating

women. But what Spain has not got is the statesman,—the statesman to turn to account the innumerable natural gifts with which the country abounds. Until that man springs up, it must be the reign of Martial Law or of Absolutism."

Mr. Gruneisen is the Nestor of war correspondents.

Miscellanea.

Sewage Farms.—Mr. W. Kempson, of South Fields, Leicester, writes on this subject:—This question would have been long ago decided, if, in the majority of instances in which sewage irrigation has been adopted, it had been carried out by practical agriculturists, instead of by Town Councils, and sanguine theorists. Where sewage is dealt with in any quantity, two things are, I think, required,—viz., under-drainage, and beds for downward filtration. Whether purification of the effluent sewage by lime to some extent is desirable before using it, is a question. In the two instances I will now give you, in which, irrigation is carried out by practical men with success, clarification of the sewage is not resorted to. The first instance to which I refer is Heathcote Sewage Farm, near Leamington, the property of Lord Warwick. I believe it is about four years since this land was drained to some extent level; covered culverts were constructed for the mains, &c. The quantity of land under treatment has increased yearly, and is now something over 400 acres. Good substantial buildings have been erected for cattle, which are chiefly fed on rye-grass, with most satisfactory results. The land is freely supplied with sewage for two years, during which rye-grass or vegetables are grown; the third year the sewage is shut off entirely, and a crop of corn (good in quantity and quality) is taken. I have visited the farm yearly for the last three years, and find that the land is improving, and the produce increasing. The effluent water is passed away in a satisfactory state, and no complaints as to nuisance arise. Notwithstanding the wetness of the last two seasons, I am told that the last stocktaking showed that the whole outlay had been repaid and a small profit realised. My second instance is a sewage farm belonging to the corporation of Wrexham, North Wales.

The Effect of Cheap Labour and Cheap Coal in Wales.—The *Ironworkers' Journal* of March 1, which is published as the authority of the Amalgamated Ironworkers of Great Britain, has the following:—"It is to be regretted that there does not appear to be any improvement in the state of trade. Hundreds of men are walking about in every district, and fail to find employment. It is a trying time for many a poor family; what the end may be is unknown, and it is well that it is so. We need not say that the chief cause of this unfortunate state of things is due to the shameful price of coal. Mine-owners may thrive and fatten on the good things that famine prices have brought about; but the iron manufacturers who have to purchase their coal and pig-iron at a time when the number of purchasers is seriously reduced, are so considerable that serious consequences to labour and to the masters so circumstanced have been brought about. In the North of England an order for rails is difficult to get hold of. This is chiefly caused by the reduced demand; and what orders there have been of late, and are coming in to the market now, are taken by Welsh houses who can take an order and make it pay, in consequence of cheap labour and coal. It is a shame that the employers of Wales should be permitted to pay from 8s. 6d. to 9s. per ton for puddling grey pig-iron. This is is so important that the attention of the workmen must be called to consider this act of injustice at the first opportunity. The workmen's wages must be advanced in Wales before the inequality of rates is removed.

Chappuis's Reflectors.—Suggestive evidence is given as to the value of reflectors where light is scarce, in the description of the ship *Devastation* by the *Times*. The writer says:—"The Chappuis corrugated reflectors fitted on board, in the after-steerage, act as efficiently as ever in throwing rays of natural light, finding its way below from any opening, however small, to adjacent parts of the deck at any desired angle. With the after-scuttle open at the extreme after-end of the steerage, where two of these reflectors are fixed, a flood of natural light is thrown over the whole of the steerage in such a volume as to pale the overhead lamps lighting the ward-room passages 50 ft. and 60 ft. distant."

The Post-Tertiary Geology of Lancashire.—A lecture by Mr. T. Mellard Reade, on this subject has been delivered before the Literary and Philosophical Society of Southport. Mr. Reade is practically acquainted with the geology of Southport and neighbourhood, which acquaintance he acquired while planning Birkdale Park, and constructing the Birkdale Sewage Works, and other undertakings in this district. The lecture was illustrated by a large map, on the scale of 6 in. to the mile, on which all the various deposits were represented, and also by numerous sections, the result of Mr. Reade's personal observations. The post-tertiary deposits of the neighbourhood are divided into two strongly-marked groups, the upper being the post-glacial, and the lower the glacial marine drift, or boulder-clay—the whole resting upon the triassic rocks, from which they are separated by an immense period of time, in which the liassic, the oolitic, cretaceous, and the whole of the tertiaries, were laid down, but which have no representatives in Lancashire. The post-glacial deposits occupy an area in Lancashire, forming a plain below the 25 ft. contour of about 75 square miles in extent. In concluding his lecture, Mr. Reade said,—"Above all, it is necessary to approach the study of Nature in a spirit of true humility, and then, whether we look at her from the artistic, the poetic, or the scientific standpoint, we are lifted above the cankering cares of business, to a wider knowledge, a loftier ideal, and a truer conception of the wondrous works of creation with which we are surrounded."

Society of Engineers.—At a meeting of the Society of Engineers, held on Monday last, Mr. William MacGeorge, President, in the chair, a paper was read on "Recent Improvements in Tin-dressing Machinery," by Mr. S. Herbert Cox. The author commenced by noticing the various impurities which occurred with tin ore, and showing the difficulty of separating the wolfram from it in the ordinary methods of treating the ore. Sholl's atmospheric stamps were mentioned, and their advantage over the old system pointed out. Briefly these were stated to be:—1st. A greater length of stroke by which the weight of the heads is reduced from 5 cwt. to about 3¼ cwt.; 2nd. A greater speed, the relative velocities being respectively 150 and 60 blows per minute; 3rd. The additional momentum produced by the compressed air, and the power thus afforded of regulating the length of the stroke. The propeller knife buddle recently introduced at Restronguet Stream Tin Works, as well as Collon's patent jigger, were described, as was Stephens's pulveriser, in which, by means of strips of wood placed in slots in the covering-plate, the rotating action of the water is turned into a jigging one, thus carrying the pulverised ore through the covering-plate, whence it is conveyed away by launders.

The Newspaper Press Fund.—This association has taken a wise step, with a view to extend the circle of those who are interested in its progress and welfare. At the general meeting held on the 28th ult., it was resolved that "Every donor of ten guineas or upwards in one sum, not being eligible as an ordinary member of the society, shall be considered an honorary member, and be entitled to attend and vote at all general meetings, excepting only such as have been specially convened for the alteration or amendment of the rules." The grants made during the past year amounted to 490*l.* 3*s.*, and the number of cases was thirty-six. The investments have been augmented by the purchase of a further sum of 1,000*l.* Eastern Bengal Railway Stock Guaranteed Five per Cents, by which the stock and securities of the society are increased to 8,300*l.* The ordinary income for the year is estimated at 687*l.* 1*s.* 6*d.*, and there was an available cash balance on the 31st of December last of 399*l.* 4*s.* 7*d.* The chairman (Mr. Gruneisen) announced that his Grace the Duke of Somerset, K.G., had consented to preside at the annual dinner on the 30th of May.

Covent-Garden.—The Duke of Bedford has determined to cover in Covent-garden market to a certain extent. Several are of opinion that the proposed erection is not high enough, and that the 4 ft. left open on either side is very objectionable. The openings at the side and the low roof are stated to be for the convenience of those persons who occupy the upper rooms over the shops in the centre row. The *Garden* says, so far as we could judge from the model exhibited, the improvement contemplated will be slight indeed to what is required.

The Peabody Buildings.—The report of the Peabody trustees shows that they had expended up to the close of last year in land and buildings 300,000*l.* Upwards of 66,000*l.* of this sum are at present unproductive, as two sites are not yet built upon, and the dwellings upon two other sites are not finished. The number of families now in residence at the trustees' buildings is 882, occupying 1,875 rooms. The average rent per room is 1*s.* 10*d.* per week, and the average weekly earnings of the head of each family is about 1*l.* 3*s.* 1*d.* Although the cost of labour and building materials is constantly increasing, the trustees have not up to the present time advanced their rents, except in a few exceptional instances. The expenditure during the year, for land and buildings, exceeds 39,000*l.*, and the income of the two trusts amounts to 12,973*l.* 5*s.* 8*d.* The net income derived from the buildings is about 2½ per cent. per annum upon the outlay.

The New Public Baths and Washhouses at Alnwick.—The New Public Baths and Washhouses, together with a Soup Kitchen and Working Men's Club House, which the Duke of Northumberland is erecting in Clayport-street, Alnwick, are now far advanced towards completion, and will be ready for use, it is reported, in a few months' time. The buildings have a frontage of about 80 ft. The baths are lighted from the roof, and are fitted up with every necessary appliance. The third part of the new building embraces an entrance-hall, dining-room, smoking-room, bar, kitchen, larder, pantry, &c., on the ground floor, and the main staircase leads to the reading-room, bagatelle-room, parlour, and committee-room, and further backwards a large soup kitchen. The upper story is appropriated to bedrooms for the staff of servants.

Sewage Utilisation in Liverpool.—On Saturday last the half-yearly meeting of the Liverpool Sewage Utilisation Company was held, when the report of the directors, submitted to the meeting, stated that the company had at last succeeded in getting into a good position since the liquidation, and now, for the first time, the scheme was to receive a trial, though on too small a scale. When the affairs of the company were taken in hand by the present directors, it was found that everything had got into a very neglected condition, owing to the suspension of the company, and in consequence of the lateness of the season, the farm at Ince Blundell could not be brought under proper cultivation. Future success, however, was anticipated. The report was adopted unanimously. It was stated that many of the neighbouring farmers had expressed their readiness to buy the sewage-manure.

The Midland Railway Company, for whose works a vast amount of house property in Somers Town has already been destroyed, are now seeking by a new Bill to obtain compulsory powers to take property on the eastern side of St. Pancras workhouse, and also certain lands, houses, and buildings which are bounded by Skinner-street and Brewer-street on the east, by Elstree-street and Phœnix-street on the north, by Ossulston-street on the west, and Euston-road on the south. The district specified contains 2 000 houses, in a dense population of the poorest class. Several hundred tradesmen and owners of property in Somers Town have waited on the General Purposes Committee of the St. Pancras Vestry, to ask for assistance against the proposal, and the committee have promised to urge the Vestry to give every possible opposition to the Bill becoming law.

Gigantic Scheme for the Extension of Boston, U.S.—A large meeting of merchants and business men has been held at Boston, Mass., to hear the Hon. Edward Atkinson explain his scheme for extending the shipping accommodation of the port. He proposed to provide for an inevitable increase of business by filling in the vast area owned by the Commonwealth now covered by water round South Boston, and claimed that the filling would remunerate the State for what it had expended on the Hoosac Tunnel. A very large area of land would be made available for city improvements and for docking accommodation. Mr. Atkinson's scheme also embraced an extension of railroads, to develop the trade of the port and add to its commercial importance.

The Barracks at Oxford are about to be commenced, and the contract has been given to Messrs. W. Downs & Co., Union-street, Southwark.

The London Locksmiths.—An adjourned meeting of the London locksmiths has been held, for the purpose of taking further steps to organise an association. There was a large attendance, and thirteen new members joined, making fifty-eight, who had given in their support to the movement up to the present time. Mr. Lewis was appointed president, Mr. Field vice-president, and Mr. G. Harper, secretary. The committee were next elected, so as to represent each firm in the association. The two trustees who were appointed were Mr. E. Cheshire and M. Courtney. Mr. Harper was elected as treasurer. The first subscription was made, and the payments were numerous.

The River Wall at Chatham.—The repair of the extensive breach in the river wall of the Gun-wharf at Chatham will shortly be commenced. Part of the wall was forced into the Medway last autumn during a thunderstorm by the bursting of a sewer running from the Marine Barracks. A new drain has since been constructed, and tenders will now be asked for to repair the wall. This work is expected to cost some thousands of pounds.

The Proposed Conservative Hall for Bedminster.—A company has been formed, with a capital of 2,000*l.*, in 1*l.* shares, which are being taken up promptly. The directors have several plots of land in view in the central part of the parish, but the site of the hall has not yet been determined on. When not required for political purposes, the hall will be let for penny readings and entertainments of a miscellaneous character.

Exhibition in Paris.—The International Exhibition of Arts and Manufactures, which is to be held in Paris in 1875, will be organised by private persons, as the present state of the finances does not permit the Government to grant any subsidy for that purpose. The Government, however, is earnestly desirous that the undertaking should be attended with every success, and has placed the Palais de l'Industrie at the disposal of the Exhibition Committee.

Isfield.—At the last meeting of the Archæological Society, it was intimated that the Rev. S. F. Russell, the rector, intended to take steps to restore the parish church, which was becoming somewhat dilapidated, and active measures are in progress for obtaining the necessary funds. Plans have been prepared by Mr. J. Pearson, and he estimates the cost of the restoration, and of the addition of a north aisle at 1,350*l.* Subscriptions have already been promised to the extent of about 780*l.*, and the rector has issued an appeal for support.

The Romans in London.—The interesting Roman antiquities discovered in excavating the foundation of the premises belonging to the National Safe Deposit Company, near the Mansion House, have been lent to the South Kensington Museum until the completion of the building, and they may be seen there in the north court.

Brighton Aquarium.—The fifth ordinary general meeting of the Brighton Aquarium Company has been held in London, and notwithstanding the heavy expenses necessary in the infancy of the establishment, a dividend at the rate of 10 per cent. for the half-year has been declared. The balance-sheet showed a gross revenue of 21,944*l.* odd.

Waterworks, Nunhead.—Messrs. Joseph Quick & Son, M.Inst.C.E., wish it stated that these works were designed by them alone, and not in conjunction with Mr. Just, as elsewhere asserted.

Church at Addiscombe. — Competition designs are now on view.

TENDERS

For villa residence, Brondsbury Park, Kilburn, for Mr. C. Coulthard. Mr. H. H. Bridgman, architect :—

Elkington (accepted).

Accepted for recovering the roof of Newtown House, near Newbury, Berks, for Mr. W. P. B. Chatteris. Mr. James H. Money, architect :—

Bricklayer, Carpenter, and Slater.

Adey	£770 0 0

Plumber and Glazier.

Boyer & Co.	360 6 6

For the erection of new schools in the parish of Speenhamland, Berks. Mr. James H. Money, architect :—

Hitchman	£588 2 5
Messrs. Harrison (accepted)	558 16 6

For covered loose boxes and additional pens at the New Cattle Market, Newbury, Berks, for the Local Board of Health, Newbury. Mr. James H. Money, architect. Quantities supplied :—

James	£274 18 6
Messrs. Harrison	245 10 6
Whiter (accepted)	235 10 0

For proposed vicarage house, St. John, Whetstone, for the Rev. Alfred Cay. Mr. John Norton, architect. Quantities supplied by Mr. S. J. Thacker :—

Blandford & Sons	£1,970 0 0
Tull	1,851 0 0
Keast	1,850 0 0
Niblett	1,850 0 0
Robins & Co.	1,820 0 0
Staines & Sons	1,786 0 0
Webber	1,768 0 0
Wicks	1,741 0 0
Walton	1,740 0 0
Gillmore	1,700 0 0
Simpson & Baker	1,680 0 0
Boyce	1,641 0 0
Jopling & Co.	1,520 0 0

For the erection of new general and infectious hospitals, Blean Union Workhouse, Kent. Mr. Benjamin Adkins, architect :—

Bushell & Son	£4,414 0 0
Welby	4,163 0 0
Jopling & Co.	4,114 0 0
Wilson	4,080 0 0
Adams	4,061 0 0
Adcock	4,045 0 0
Featherstone & Lucas	4,024 7 0
Shrubsole	3,997 0 0
Wright Brothers & Goodchild	3,975 0 0
Gaskin & Godden	3,896 0 0
Sollitt	3,791 0 0
Callund	3,725 0 0
Naylar	3,693 0 0
Cornelius (accepted)	3,564 0 0
Dover, Son, & Co.	3,555 5 0

For municipal buildings, Leicester. Mr. Francis J. Hames, architect. Quantities supplied by Messrs. Franklin & Andrews :—

		Extra for Ketton Stone.
Dove, Brothers	£35,825	£875
Hill, Higgs, & Hill	33,394	800
Downs & Co.	32,890	1,000
Lindley	32,680	1,218
Rider & Son	32,500	890
Horsman	32,249	1,850
Osborne	31,900	1,000
Brass	31,285	650

For the erection of casual wards, and alteration and enlargement of infirmary, at St. Mary's Workhouse, Rotherhithe, for the Guardians of St. Olave's Union. Mr. H. Saxon Snell, architect :—

	Casual Wards, including Fittings and Furniture.	Infirmary, including Fittings of every description.
Stephenson	£3,937	£18,103
Wicks, Bangs, & Co.	3,200	17,300
Nightingale	3,420	16,990
Chappell	3,239	16,855
Downs	3,260	16,790
Kent	3,149	16,779
Cullum	3,196	16,678
Simpson & Baker	3,125	16,620
Crockett	2,997	15,674
Wall	2,913	15,553
Wagner	3,000	15,440
Manley & Rogers	2,800	15,000
Croaker (accepted)	2,882	14,859

For the erection of six semi-detached villa residences at Clacton-on-Sea, Essex, for Mr. A. Penfold and Mr. W. Agate, of Woolwich. Mr. G. Gard Pye, architect :—

Clarke & Son	£3,245 0 0
Snelling (accepted)	3,000 0 0

For building new tramp-cells, receiving-wards, and porter's lodge, at Bletchingley. Alex. R. Stenning, architect :—

Glaston	£2,240 0 0
Tull	2,024 9 7
Loose	1,935 0 0
Nightingale	1,850 0 0
Blake & Ramplin (too late)	1,784 0 0
Mason & Co.	1,745 0 0
Waters	1,695 0 0
Charlwood, Brothers	1,690 0 0
Keast & Co. (too late)	1,685 0 0
Wallis	1,675 0 0
Woodward	1,666 0 0
Simons	1,633 0 0
Barnes	1,600 0 0
Wright, Brothers, & Co.	1,575 0 0
Bulford	1,564 0 0
Lacy	1,550 0 0
Lawrence	1,528 10 0
Worsell	1,500 0 0
Peskett & Co.	1,499 0 0
Boyce	1,494 0 0
Warr	1,487 0 0
Jopling & Co.	1,480 0 0
Dives & Co.	1,470 0 0
Galyer	1,460 0 0
Cook	1,450 0 0
Morris	1,412 0 0
Longman	1,395 10 0
Kesterton	1,350 7 3
Steer	1,295 0 0

Hot-water Apparatus, &c.

Bonner	£420 2 0
Dye & Son	142 3 9

For alterations to Prince of Wales public-house, Drury-lane. Mr. H. J. Newton, architect for Messrs. Watney & Co.; Mr. J. Viney, architect for tenant. Quantities by Mr. Budd :—

Parsons	£1,350 0 0
Hyde	1,334 0 0
Godden	1,319 0 0
Hockley	1,125 0 0
Taylor	1,093 0 0
Shurmur (accepted)	1,044 0 0

In our last list of tenders was one for new warehouses for Messrs. Hudson & Sons, Wells-street, Oxford-street, in which the name of the firm selected to do the work was misspelt, from bad or careless writing, "Jossein & Co." instead of "Jopling & Co."

TO CORRESPONDENTS.

A. L.—A Ringer.—J. R. W.—E. D.—J. H. M.—E. P.—B. A.—Chicago.—Mr. P.—J. E. D.—L. St. C.—H. S. S.—G. G. P.—J. K.—H. J. N.—W. D. & Co.—E. G.—F. K.—W. H. P. (thanks. List printed was probably in type first). — C. A. J. (shall have attention).—H. H. B. (accounts should be sent).—J. P. S. (next week).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

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